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**IBM**

**Note**

Before using this information and the product it supports, read the information in "Notices" a pagina 159.

This edition applies to version 10, release 1, modification 0 of IBM Campaign and to all subsequent releases and modifications until otherwise indicated in new editions.

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## Capitolo 1. Using macros in IBM Campaign

This chapter provides usage information about IBM® Campaign macros. Be sure to read this chapter before you attempt to use macros in IBM Campaign.

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### Macro function summaries for IBM Campaign

The tables in this section summarize the macro functions by category.

Detailed reference pages for each macro function are provided in alphabetical order in Capitolo 3, “IBM Macros Reference”, a pagina 17.

**Important:** Macros can apply to both IBM Campaign and IBM Interact or to only one of these products. The macro descriptions identify the products in which they are available.

See “Macro function parameters for IBM Campaign” a pagina 8 for information about the macro function input parameters.

### Statistical Functions

Macro Name	Returns	Description
AVG	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the arithmetic mean or average of a range of cells
COUNT	Single value in a new column.	Counts the number of values in a specified data range
MAX	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the maximum of a range of cells
MEAN	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the arithmetic mean or average of a range of cells
MIN	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the minimum of a range of cells

Macro Name	Returns	Description
STDV or STDEV	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the standard deviation of a range of cells
VARIANCE	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the variance of a range of cells

## Math and Trigonometric Functions

Macro Name	Returns	Description
ABS	One column for each input column	Computes the absolute value of the contents of the specified data range
ACOS	One column for each input column	Computes the arc cosine of the contents of the specified data range
ACOT	One column for each input column	Computes the arc cotangent of the contents of the specified data range
ASIN	One column for each input column	Computes the arc sine of the contents of the specified data range
ATAN	One column for each input column	Computes the arc tangent of the contents of the specified data range
AVG	One column for each input column	Calculates the arithmetic mean or average of the cells in the specified data range
BETWEEN	One column for each input column	Compares two values to determine whether the provided value is between two other values
CEILING	One column for each input column	Computes the ceiling of each value in the specified data range
COLUMN	One column for each input column	Creates new columns, vertically concatenating the input values in each column
COS	One column for each input column	Computes the cosine of the contents of the specified data range
COSH	One column for each input column	Computes the hyperbolic cosine of the contents of the specified data range

Macro Name	Returns	Description
COT	One column for each input column	Computes the cotangent of the contents of the specified data range
COUNT	One column containing a single value	Counts the number of cells containing values in the specified data range
EXP	One column for each input column	Computes the natural number (e) raised to the contents of each cell in the specified data range
FACTORIAL	One column for each input column	Computes the factorial of each value in the specified data range
FLOOR	One column for each input column	Computes the floor of each value in the specified data range
FRACTION	One column for each input column	Returns the fractional part of each value in the specified data range
INT	One column for each input column	Computes the integer value (rounded down) of the contents of the specified data range
INVERSE	One column for each input column	Computes the negative of the contents of the specified data range
LN	One column for each input column	Computes the natural log of the contents of the specified data range
LOG	One column for each input column	Computes the natural log of the contents of the specified data range
LOG2	One column for each input column	Computes the log base2 of the contents of the specified data range
LOG10	One column for each input column	Computes the log base10 of the contents of the specified data range
MAX	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the maximum of a range of cells
MEAN	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the arithmetic mean or average of a range of cells

Macro Name	Returns	Description
MIN	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the minimum of a range of cells
RANDOM	One column with the specified number of values	Returns the specified number of random numbers
RANDOM_GAUSS	One column with the specified number of values	Returns the specified number of random values from a Gaussian distribution
ROUND	One column for each input column	Computes the rounded value of the contents of the specified data range
SIGN	One column for each input column	Computes the sign (positive or negative) of the values in the specified data range
SIN	One column for each input column	Computes the sine of the contents of the specified data range
SINH	One column for each input column	Computes the hyperbolic sine of the contents of the specified data range
SQRT	One column for each input column	Computes the square root of the contents of the specified data range
STDV or STDEV	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the standard deviation of a range of cells
SUM	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the sum of a range of cells
TAN	One column for each input column	Computes the tangent of the contents of the specified data range
TANH	One column for each input column	Computes the hyperbolic tangent of the contents of the specified data range



Macro Name	Returns	Description
TOTAL	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the sum of a range of cells
TRUNCATE	One column for each input column	Returns the non-fractional part of each value in the specified data range
VARIANCE	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the variance of a range of cells

## String Functions

Macro Name	Returns	Description
FORMAT	One column for each input column	Provides output formatting control for both numbers and strings (such as output width, alignment, numeric precision, decimal point symbol, grouping symbol, and so on). Returns the formatted output string.
LIKE	One column for each input column	Determines whether a text string matches a specified pattern
LOWER	One column for each input column	Converts string value to lowercase
LTRIM	One column for each input column	Removes leading space characters from each string value
NUMBER	One column for each input column	Converts ASCII text strings for times and dates to numeric values
POSITION	One column for each input column	Returns the starting position of a pattern in a text string
RTRIM	One column for each input column	Removes trailing space characters from each string value
STRING_CONCAT	One column with a value for each row of the shortest input column	Concatenates text strings from the specified data ranges
STRING_HEAD	One column for each input column	Returns the first <i>n</i> characters of each string in the specified data range

Macro Name	Returns	Description
STRING_LENGTH	One column for each input column	Returns the length of each string in the specified data range
STRING_PROPER	One column for each input column	Converts each string value by changing the first letter or any letter that follows a white space character or symbol (other than underscore) into uppercase, and all other characters into lowercase
STRING_SEG	One column for each input column	Returns the string segment between two specified indexes
STRING_TAIL	One column for each input column	Returns the last <i>n</i> characters of each string in the specified data range
SUBSTR or SUBSTRING	One column for each input column	Returns characters from a string from a starting position
UPPER	One column for each input column	Converts string value to uppercase

## Date and Time Functions

Macro Name	Returns	Description
CURRENT_DATE	One column for each input column	Returns the current date in format
CURRENT_DAY	One column for each input column	Returns the current day of the month as a number from 1-31
CURRENT_JULIAN	One column for each input column	Returns the Julian number for the current date
CURRENT_MONTH	One column for each input column	Returns the current month of the year as a number from 1-12
CURRENT_TIME	One column for each input column	Returns the current time as a string
CURRENT_WEEKDAY	One column for each input column	Returns the current weekday of the month as a number from 0-6
CURRENT_YEAR	One column for each input column	Returns the current year as a number
DATE	One column for each input column	Converts a date string into a Julian date
DATE_FORMAT	One column for each input column	Transforms date formats
DATE_JULIAN	One column for each input column	Returns the Julian date

Macro Name	Returns	Description
DATE_STRING	One column for each input column	Returns the date string of the Julian date
DAY_BETWEEN	One column for each input column	Returns the number of days between two dates
DAY_FROMNOW	One column for each input column	Returns the number of days from the current date to the specified date
DAY_INTERVAL	One column for each input column	Returns the number of days between two dates
DAYOF	One column for each input column	Returns the day of the month as a number
MONTHOF	One column for each input column	Returns the month of the year as a number
WEEKDAY	One column for each input column	Converts ASCII text date strings to the day of the week
WEEKDAYOF	One column for each input column	Returns the weekday of the week as a number
YEAROF	One column for each input column	Returns the year as a number

## Grouping Functions

Macro Name	Returns	Description
GROUPBY	One new column with a value for each row	Summarizes across multiple rows of data within a group
GROUPBY_WHERE	One new column with a value for each row	Summarizes across multiple rows of data that meet a specified condition and are within a group

## Miscellaneous Functions

Macro Name	Returns	Description
IF	One column with a value for each row of the shortest input column	Begins a conditional if-then-else statement
ISERROR	One column with a value for each row of the shortest input column	Returns a one if any value in the input row contains an error (???) cell, else zero
ISEVEN	One column for each input column	Tests if input values are even (that is, divisible by two)
ISODD	One column for each input column	Tests if input values are odd (that is, not divisible by two)
ROWNUM	One column for each input column	Generates sequential numbers from one to the number of records

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## Macro function parameters for IBM Campaign

This section describes the parameters and usage for macro functions in IBM Campaign.

### Format Specifications

This section describes the format for some commonly used parameters. It applies to all references to these parameters by macro function specifications in this chapter.

#### **data**

The data parameter represents a data column for a macro function to act upon.

It can be a constant or a field. See the specific macro function for details.

**Nota:** IBM Campaign does not support calculations on multiple fields at the same time or on a subset of row.

Some other parameter names also use the same format as data. The descriptions of these parameters reference this section and format.

#### **keyword**

The keyword parameter controls the behavior of the macro function. It indicates that a keyword can be specified (if it is omitted, the default is used). The keyword choices are listed for each individual macro function in the following form:

**{choice1 | choice2 | choice3}**

Select the keyword choice providing the wanted behavior. The default choice is shown in bold. For example, given the following options:

**{RADIANs | DEGREEs}**

The following macro functions are both valid:

`COS(V1, RADIANs) COS(V1, DEGREEs)`

**Nota:** Many macro functions take the keyword parameters {ALL | COL | ROW}. These keywords do not apply in IBM Campaign because the input data is always a single column or field. The macro always behaves as if the COL keyword were specified. Therefore, you do not need to specify these keywords when using IBM Campaign.

### Use of Constants

Most of the macro function parameters can take numeric constants or expressions evaluating to a numeric constant (macro functions operating on strings can take string constants).

In macro functions performing record-by-record operations (for example, adding two numeric columns), using a constant is equivalent to specifying a column containing that constant value in each row. Essentially, when a constant is provided as an input parameter, the constant is expanded to same length as the input.

Some macro functions can take ASCII text strings and numeric constants. Parameters that can accept both numeric constants and ASCII text strings are noted in the "Parameters" section of each macro function.

Examples are provided in the following table.

Function Definition	How the Constant Is Interpreted
PERCENT_UTILIZ = (CURR_BAL*100)/ CREDIT_LIM	The constant 100 is interpreted as a column containing the same number of rows as the column CURR_BAL, with each row containing the constant 100. The derived field PERCENT_UTILIZ will contain each value of CURR_BAL multiplied by 100 and divided by each value of CREDIT_LIM.
NAME = STRING_CONCAT ("Mr. ", LAST_NAME)	The constant "Mr." is interpreted as a column containing the same number of rows as the column LAST_NAME, with each row containing the constant "Mr.". The derived field NAME will contain each of the text strings in LAST_NAME prefaced by "Mr.".



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## Capitolo 2. Using macros in IBM Interact

This chapter provides usage information about IBM Interact macros. Be sure to read this chapter before you attempt to use macros in IBM Interact.

### Formula Helper and Macro Expression Syntax Checking

**Important:** The Formula Helper dialog box, including its Syntax Checking function, currently validates macro expressions according to what IBM Campaign supports. However, IBM Interact supports only a subset of Campaign macro functionality. Therefore, you must ensure that the macros and keywords (such as date format keywords) used for Interact are supported. Look for notes related to Interact in the Macros Reference chapter of this guide.

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### Macro function summaries for IBM Interact

The tables in the following sections provide detailed descriptions of the macros that are specific to IBM Interact.

Detailed reference pages for each macro function are provided in alphabetical order in Capitolo 3, “IBM Macros Reference”, a pagina 17.

**Important:** Macros can apply to both IBM Campaign and IBM Interact or to only one of these products. The macro descriptions identify the products in which they are available.

“Macro function parameters for IBM Interact” a pagina 14 provides information about the macro function input parameters for Interact.

### Statistical Functions

Macro Name	Returns	Description
AVG	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the arithmetic mean or average of a range of cells
MAX	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the maximum of a range of cells
MEAN	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the arithmetic mean or average of a range of cells

Macro Name	Returns	Description
MIN	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the minimum of a range of cells
STDV or STDEV	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the standard deviation of a range of cells

## Math and Trigonometric Functions

Macro Name	Returns	Description
AVG	One column for each input column	Calculates the arithmetic mean or average of the cells in the specified data range
MAX	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the maximum of a range of cells
MEAN	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the arithmetic mean or average of a range of cells
MIN	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the minimum of a range of cells
STDV or STDEV	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the standard deviation of a range of cells



Macro Name	Returns	Description
SUM	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the sum of a range of cells
TOTAL	Single value in a new column for the ALL keyword; one column with a single value for each input column for the COL keyword; one column with a value for each row for the ROW keyword.	Computes the sum of a range of cells

## String Functions

Macro Name	Returns	Description
LIKE	One column for each input column	Determines whether a text string matches a specified pattern
LOWER	One column for each input column	Converts string value to lowercase
LTRIM	One column for each input column	Removes leading space characters from each string value
NUMBER	One column for each input column	Converts ASCII text strings for times and dates to numeric values
RTRIM	One column for each input column	Removes trailing space characters from each string value
STRING_CONCAT	One column with a value for each row of the shortest input column	Concatenates strings from the specified data ranges
SUBSTR or SUBSTRING	One column for each input column	Returns characters from a string from a starting position
UPPER	One column for each input column	Converts string value to uppercase

## Date and Time Functions

Macro Name	Returns	Description
CURRENT_DATE	One column for each input column	Returns the current date in format
CURRENT_DAY	One column for each input column	Returns the current day of the month as a number in the range 1 - 31

Macro Name	Returns	Description
CURRENT_MONTH	One column for each input column	Returns the current month of the year as a number in the range 1 - 12
CURRENT_WEEKDAY	One column for each input column	Returns the current weekday of the month as a number in the range 0 - 6
CURRENT_YEAR	One column for each input column	Returns the current year as a number
DATE	One column for each input column	Converts a date string into a Julian date
DATE_FORMAT	One column for each input column	Transforms date formats

## Miscellaneous Functions

Macro Name	Returns	Description
EXTERNALCALLOUT	Values as defined by the custom application written with the ExternalCallout API	<p>Calls a custom application written with the ExternalCallout API.</p> <p>For more information, see the <i>IBM Interact Administrator's Guide</i>.</p>
IF	One column with a value for each row of the shortest input column	Begins a conditional if-then-else statement

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## Macro function parameters for IBM Interact

This section describes the parameters and usage for macro functions in IBM Interact.

### Format Specifications

This section describes the format for some commonly used parameters. It applies to all references to these parameters by macro function specifications in this section.

#### data

The data parameter represents a data column for a macro function to act upon. It can be a constant or a field. See the specific macro function for details.

**Nota:** IBM Interact does not support calculations on multiple fields at the same time, or on a subset of rows.

Some other parameter names also use the same format as data. The description of these parameters refers to this section and format.

#### keyword

The keyword parameter controls the behavior of the macro function. It indicates that a keyword can be specified (if it is omitted, the default is used). The keyword choices are listed for each individual macro function in the following form:

{**choice1** | choice2 | choice3}

Select the keyword choice providing the wanted behavior. The default choice is shown in bold. For example, given the following options:

{**RADIANS** | DEGREES}

The following macro functions are both valid:

COS(V1, RADIANS) COS(V1, DEGREES)

**Nota:** Many macro functions take the keyword parameters {ALL | COL | ROW}. These keywords do not apply in IBM Interact because the input data is always a single column or field. The macro always behaves as if the COL keyword were specified. Therefore, you do not need to specify these keywords when using IBM Interact.

## Use of Constants

Most of the macro function parameters can take numeric constants or expressions evaluating to a numeric constant (macro functions operating on strings can take string constants).

In macro functions performing record-by-record operations (for example, adding two numeric columns), using a constant is equivalent to specifying a column containing that constant value in each row. Essentially, when a constant is provided as an input parameter, the constant is expanded to same length as the input.

Some macro functions can take ASCII text strings as well as numerical constants. Parameters that can accept both numeric constants and ASCII text strings are noted in the "Parameters" section of each macro function.

Examples are provided in the following table.

Function Definition	How the Constant Is Interpreted
PERCENT_UTILIZ = (CURR_BAL*100)/ CREDIT_LIM	The constant 100 is interpreted as a column containing the same number of rows as the column CURR_BAL, with each row containing the constant 100. The derived field PERCENT_UTILIZ will contain each value of CURR_BAL multiplied by 100 and divided by each value of CREDIT_LIM.
NAME = STRING_CONCAT ("Mr.", LAST_NAME)	The constant "Mr." is interpreted as a column containing the same number of rows as the column LAST_NAME, with each row containing the constant "Mr.". The derived field NAME will contain each of the text strings in LAST_NAME prefaced by "Mr.".

**Nota:** Constants, such as DT\_DELIM\_M\_D\_Y, require single quotation marks.



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## Capitolo 3. IBM Macros Reference

This section describes each available macro that is available for use in IBM Campaign, IBM Interact, or both. Macros are listed in alphabetical order.

**Important:** Do not use function names or keywords from the IBM Macro Language for column headings on user tables in IBM Campaign, whether mapping from a database or a flat file. These reserved words can cause errors if used in column headings on mapped tables.

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### Valid Date Format Keywords

The following table shows the keywords for valid formats, with a description and example of each.

Keyword	Description	Example(s)
MM	2-digit month	01, 02, 03, ..., 12
MMDD	2-digit month and 2-digit day	March 31 is 0331
MMDDYY	2-digit month, 2-digit day, and 2-digit year	March 31, 1970 is 033170
MMDDYYYY	2-digit month, 2-digit day, and 4-digit year	March 31, 1970 is 03311970
DELIM_M_D	Any delimited month followed by day	March 31, 3/31, or 03-31
DELIM_M_D_Y	Any delimited month, day, and year	March 31, 1970 or 3/31/70
DELIM_M_D_YYYY	Any delimited month, day, and 4-digit year	March 31, 1970 or 3/31/1970
DELIM_Y_M	Any delimited year followed by month	March, 70; 3-70; or 3/1970
DELIM_Y_M_D	Any delimited year, month, and day	1970 Mar 31 or 70/3/31
YYMMM	2-digit year and 3-letter month	70MAR
YYMMDD	2-digit year, 3-letter month, and 2-digit day	70MAR31
YY	2-digit year	70
YYMM	2-digit year and 2-digit month	7003
YYMMDD	2-digit year, 2-digit month, and 2-digit day	700331
YYYYMMM	4-digit year and 3-letter month	1970MAR
YYYYMMDD	4-digit year, 3-letter month, and 2-digit day	1970MAR31
YYYY	4-digit year	1970

<b>Keyword</b>	<b>Description</b>	<b>Example(s)</b>
YYYYMM	4-digit year and 2-digit month	197003
YYYYMMDD	4-digit year, 2-digit month, and 2-digit day	19700331
DELIM_M_Y	Any delimited month followed by year	3-70, 3/70, Mar 70, March 1970
DELIM_D_M	Any delimited day followed by month	31-3, 31/3, 31 March
DELIM_D_M_Y	Any delimited day, month, and year	31-MAR-70, 31/3/1970, 31 03 70
DD	2-digit day	31
DDMMM	2-digit day and 3-letter month	31MAR
DDMMYY	2-digit day, 3-letter month, and 2-digit year	31MAR70
DDMMYYYY	2-digit day, 3-letter month, and 4-digit year	31MAR1970
DDMM	2-digit day and 2-digit month	3103
DDMMYY	2-digit day, 2-digit month, and 2-digit year	310370
DDMMYYYY	2-digit day, 2-digit month, and 4-digit year	31031970
MMYY	2-digit month and 2-digit year	0370
MMYYYY	2-digit month and 4-digit year	031970
MMM	3-letter month	MAR
MMMDD	3-letter month and 2-digit day	MAR31
MMMDYY	3-letter month, 2-digit day, and 2-digit year	MAR3170
MMMDYYYY	3-letter month, 2-digit day, and 4-digit year	MAR311970
MMMY	3-letter month and 2-digit year	MAR70
MMMYYY	3-letter month and 4-digit year	MAR1970
MONTH	Month of the year	January, February, March, and so on or Jan, Feb, Mar, and so on
WEEKDAY	Day of the week	Sunday, Monday, Tuesday, and so on (Sunday = 0)
WKD	Abbreviated day of the week	Sun, Mon, Tues, and so on (Sun = 0)

---

## ABS macro

The ABS macro is available only in IBM Campaign.

### Syntax

ABS(data)

### Parameters

data

The numerical values for which to compute the absolute value. This parameter can be a constant value, a column, a cell range, or an expression that evaluates to any of these types. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

ABS calculates the absolute value of the numbers in the specified data range. The absolute value of a number is its value without its sign (that is, positive numbers are unchanged; negative numbers are returned as positive numbers). ABS returns one new column for each input column, each containing the absolute value of numbers in the corresponding input column.

### Examples

TEMP = ABS(-3) or TEMP = ABS(3)
Creates a column named TEMP containing the value 3.
TEMP = ABS(V1)
Creates a column named TEMP, where each value is the absolute value of the contents of column V1.
TEMP = ABS(V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the absolute values of the contents of column V1, the values of the VX column are the absolute values of the contents of column V2, and the values of the VY column are the absolute values of the contents of column V3.
TEMP = ABS(V1[10:20])
Creates a column named TEMP, where the first 11 cells contain the absolute values of the values in rows 10-20 of column V1. The other cells in TEMP are empty.
TEMP = ABS(V1[1:5]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the absolute values of the corresponding rows of column V1, and the values in column VX are the absolute values of the corresponding rows of column V2.

### Related functions

Function	Description
SIGN	Computes the sign (positive or negative) of the values in the specified data range.

---

## ACOS macro

The ACOS macro is available only in IBM Campaign.

### Syntax

ACOS( data [, units\_keyword ])

### Parameters

data

The numerical values to compute the arc cosine value of. This parameter can be a constant value, a column, a cell range, or an expression that evaluates to any of these types. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

units\_keyword

This optional keyword determines whether the input values and results are interpreted as degrees or radians. Select one of the following values:

RADIAN - Performs the calculations in radians (default)

DEGREE - Performs the calculations in degrees

If this parameter is not specified, the default is radians. (To convert from radians to degrees, divide by PI and multiply by 180.)

For more details on using keywords in IBM Campaign, see "Format Specifications" a pagina 8.

### Description

ACOS calculates the arccosine of the values in the specified data range. The arccosine is the angle whose cosine is the contents of each cell. ACOS returns one new column for each input column, each containing the arccosine of numbers in the corresponding input column.

If the keyword RADIAN is used, ACOS returns values in the range 0 to  $\pi$ . If the keyword DEGREE is used, ACOS returns values in the range 0 - 180.

**Nota:** The cell contents of each specified column must have values between -1.0 and 1.0 inclusive. Otherwise, a blank cell is returned for each invalid input.

### Examples

TEMP = ACOS(0) or TEMP = ACOS(0, 0) or TEMP = ACOS(0, RADIAN)
Creates a column named TEMP containing the value 1.571 ( $\pi/2$ radians).
TEMP = ACOS(0, 1) or TEMP = ACOS(0, DEGREE)
Creates a column named TEMP containing the value 90 (degrees).



TEMP = ACOS(V1)
Creates a column named TEMP, where each value is the arccosine (in radians) of the contents of column V1.
TEMP = ACOS(V1:V3, 1)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the arccosines of the contents of column V1, the values of the VX column are the arccosines of the contents of column V2, and the values of the VY column are the arccosines of the contents of column V3. All values are in degrees.
TEMP = ACOS(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the arccosines of the values in rows 10-20 of column V1 (in radians). The other cells in TEMP are empty.
TEMP = ACOS(V1[1:5]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the arccosines of the corresponding rows of column V1, and the values in column VX are the arccosines of the corresponding rows of column V2. All values are in radians.

## Related functions

Function	Description
ACOT	Computes the arc cotangent of the contents of the specified data range
ASIN	Computes the arc sine of the contents of the specified data range
ATAN	Computes the arc tangent of the contents of the specified data range
COS	Computes the cosine of the contents of the specified data range

---

## ACOT macro

The ACOT macro is available only in IBM Campaign.

### Syntax

ACOT(data [, units\_keyword])

### Parameters

data

The numerical values to compute the arc cotangent of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

units\_keyword

This optional keyword determines whether the input values and results are interpreted as degrees or radians. Select one of the following:

RADIAN - Performs the calculations in radians (default)

DEGREE - Performs the calculations in degrees

If this parameter is not specified, the default is radians. (To convert from radians to degrees, divide by PI and multiply by 180.)

For more details on using keywords in IBM Campaign, see "Format Specifications" a pagina 8.

## Description

ACOT returns the angle whose cotangent is the contents of each cell. ACOT returns one new column for each input column, each containing the arccotangent of numbers in the corresponding input column. 64-bit floating-point numbers are used.

## Examples

<code>TEMP = ACOT(0.5)</code> or <code>TEMP = ACOT(0.5, 0)</code> or <code>TEMP = ACOT(0.5, RADIAN)</code>
Creates a column named TEMP containing the value 2.157 (radians).
<code>TEMP = ACOT(1, 1)</code> or <code>TEMP = ACOT(1, DEGREE)</code>
Creates a column named TEMP containing the value 0.022 (1/45) degrees.
<code>TEMP = ACOT(0)</code>
Creates a column named TEMP containing the value MAX32_Float in radians.
<code>TEMP = ACOT(V1)</code>
Creates a new column named TEMP, where each value is the arccotangent (in radians) of the contents of column V1.
<code>TEMP = ACOT(V1:V3, 1)</code>
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the arccotangents of the contents of column V1, the values of the VX column are the arccotangents of the contents of column V2, and the values of the VY column are the arccotangents of the contents of column V3. All values are in degrees.
<code>TEMP = ACOT(V1[10:20])</code>
Creates a new column named TEMP, where the first 11 cells contain the arccotangents of the values in rows 10-20 of column V1 (in radians). The other cells in TEMP are empty.
<code>TEMP = ACOT(V1[1:5]:V2)</code>
Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the arccotangents of the corresponding rows of column V1, and the values in column VX are the arccotangents of the corresponding rows of column V2. All values are in radians.

## Related functions

Function	Description
ACOS	Computes the arc cosine of the contents of the specified data range
ASIN	Computes the arc sine of the contents of the specified data range

Function	Description
ATAN	Computes the arc tangent of the contents of the specified data range
COT	Computes the cotangent of the contents of the specified data range

---

## ADD\_MONTHS macro

The ADD\_MONTHS macro is available in IBM Campaign

### Syntax

```
ADD_MONTHS(months, date_string [, input_format])
```

### Parameters

months

An integer that represents a number of months to add to the date\_string.

date\_string

A text string representing a valid date, in the format DELIM\_M\_D\_Y, or in the format specified by the optional input\_format argument.

input\_format

The format that will be used for the calculated date. For a list of supported date formats, see the DATE\_FORMAT function. Note that the input\_format determines both the format of the input string and also the format of the output string.

### Description

ADD\_MONTHS returns a date after adding the specified number of months to the specified date\_string. The date will be returned in the default format (DELIM\_M\_D\_Y) or the format specified by the optional input\_format argument. If you want a different format as the output, use DATE\_FORMAT.

If increasing the month by the specified number of months produces an invalid date, then the result is calculated to be the last day of the month, as shown in the last example below. When necessary, leap years are taken into account. For example, adding one month to 31-Jan-2012 will result in 29-Feb-2012.

### Examples

ADD\_MONTHS(12, '06-25-11') adds one year (12 months) to the specified date and returns the date 06-25-12.

ADD\_MONTHS(3, '2011-06-25', DT\_DELIM\_Y\_M\_D) adds three months to the specified date and returns the date 2011-09-25.

ADD\_MONTHS(1, '02-28-2011') returns the date 03-28-2011.

ADD\_MONTHS(1, '03-31-2012') returns the date 04-30-2012.

## Related functions

Function	Description
DATE	Converts a date string into a Julian date.
DATE_FORMAT	Transforms a date of input_format to output_format.

---

## AND macro

The AND macro is available in IBM Campaign and IBM Interact.

### Syntax

```
data1 AND data2 data1 && data2
```

### Parameters

data1

The numbers to logical AND with the values in data2. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

data2

The number(s) to logical AND with the values in data1. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. The number of columns in data2 must equal the number of columns in data1, unless data2 is a constant. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

AND calculates the logical AND between the two specified data ranges. It returns a new column for each input column, each containing the corresponding column in data1 logically AND-ed to the corresponding column of data2 (that is, the first column of data1 is logically AND-ed to the first column of data, the second column with the second column, and so on).

If data2 is a constant, each value in data1 is logically AND-ed by that value. If data2 contains one or more columns, the calculations are performed on a row-by-row basis between one column from data2 and one column from data1. The first row of data1 is logically AND-ed to the first row value of data2, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

**Nota:** The AND operator can be abbreviated with a double-ampersand ( &&). Use the double-ampersand to separate the two arguments (for example, to specify V1 AND 3, you can simply type V1&&3).

## Examples

<code>TEMP = 1 AND 8</code> or <code>TEMP = 1 &amp;&amp; 8</code>
Creates a new column named TEMP containing the value one (any non-zero number is treated as a one).
<code>TEMP = V1 &amp;&amp; 1</code>
Creates a new column named TEMP with the value one for each value of column V1.
<code>TEMP = V1 &amp;&amp; V1</code>
Creates a new column named TEMP with the value one for each non-zero value in column V1 and the value zero for each zero in column V1.
<code>TEMP = V1 &amp;&amp; V2</code>
Creates a new column named TEMP, where each value is the row value of column V1 logically AND-ed with the corresponding row value of column V2.
<code>TEMP = V1:V3 &amp;&amp; V4:V6</code>
Creates three new columns named TEMP, VX, and VY. The column TEMP contains the values in V1 logically AND-ed with the corresponding row values of column V4. The column VX contains the logically AND-ed values from columns V2 and V5. The column VY contains the logically AND-ed values from columns V3 and V6.
<code>TEMP = V1[10:20] &amp;&amp; V2</code> or <code>TEMP = V1[10:20] &amp;&amp; V2[1:11]</code>
Creates a new column named TEMP, where the first 11 cells contain the logically AND-ed result of the values in rows 10-20 of column V1 by the values in rows 1-11 of column V2. The other cells in TEMP are empty.

## Related functions

Function	Description
NOT	Computes the logical NOT of the contents of the specified data range
OR	Computes the logical OR between two specified data ranges

---

## ASIN macro

The ASIN macro is available only in IBM Campaign.

### Syntax

ASIN(data [, units\_keyword])

### Parameters

data

The numerical values to compute the arc sine of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

units\_keyword

This optional keyword determines whether the input values and results are interpreted as degrees or radians. Select one of the following:

RADIAN - Performs the calculations in radians (default)

DEGREE - Performs the calculations in degrees

If this parameter is not specified, the default is radians. (To convert from radians to degrees, divide by PI and multiply by 180.)

For more details on using keywords in IBM Campaign, see "Format Specifications" a pagina 8.

## Description

ASIN calculates the arcsine of the values in the specified data range. The arcsine is the angle whose sine is the contents of each cell. ASIN returns one new column for each input column, each containing the arcsine of numbers in the corresponding input column.

If the keyword RADIAN is used, ASIN returns values in the range  $-\pi/2$  to  $\pi/2$ . If the keyword DEGREE is used, ASIN returns values in the range -90 to 90.

**Nota:** The cell contents of each specified column must have values between -1.0 and 1.0 inclusive. Otherwise, ??? is returned for each invalid input.

## Examples

TEMP = ASIN(0.5) or TEMP = ASIN(0.5, 0) or TEMP = ASIN(0.5, RADIAN)
Creates a new column named TEMP containing the value 0.524 ( $\pi/6$ radians).
TEMP = ASIN(0.5, 1) or TEMP = ASIN(0.5, DEGREE)
Creates a new column named TEMP containing the value 30 (degrees).
TEMP = ASIN(V1)
Creates a new column named TEMP, where each value is the arcsine (in radians) of the contents of column V1.
TEMP = ASIN(V1:V3, 1)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the arcsines of the contents of column V1, the values of the VX column are the arcsines of the contents of column V2, and the values of the VY column are the arcsines of the contents of column V3. All values are in degrees.
TEMP = ASIN(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the arcsines of the values in rows 10-20 of column V1 (in radians). The other cells in TEMP are empty.
TEMP = ASIN(V1[1:5]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the arcsines of the corresponding rows of column V1, and the values in column VX are the arcsines of the corresponding rows of column V2. All values are in radians.

## Related functions

Function	Description
ACOS	Computes the arc cosine of the contents of the specified data range
ACOT	Computes the arc cotangent of the contents of the specified data range
ATAN	Computes the arctangent of the contents of the specified data range
SIN	Computes the sine of the contents of the specified data range

---

## ATAN macro

The ATAN macro is available only in IBM Campaign.

### Syntax

ATAN(data [, units\_keyword])

### Parameters

data

The numerical values to compute the arc tangent of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

units\_keyword

This optional keyword determines whether the input values and results are interpreted as degrees or radians. Select one of the following:

RADIAN - Performs the calculations in radians (default)

DEGREE - Performs the calculations in degrees

If this parameter is not specified, the default is radians. (To convert from radians to degrees, divide by  $\pi$  and multiply by 180.)

For more details on using keywords in IBM Campaign, see "Format Specifications" a pagina 8.

### Description

ATAN calculates the arctangent of the values in the specified data range. The arctangent is the angle whose tangent is the contents of each cell. ATAN returns one new column for each input column, each containing the arctangent of numbers in the corresponding input column.

If the keyword RADIAN is used, ATAN returns values in the range  $-\pi/2$  to  $\pi/2$ . If the keyword DEGREE is used, ATAN returns values in the range -90 to 90.

## Examples

<code>TEMP = ATAN(1)</code> or <code>TEMP = ATAN(1, 0)</code> or <code>TEMP = ATAN(1, RADIAN)</code> Creates a new column named TEMP containing the value 0.785 ( $\pi/4$ radians).
<code>TEMP = ATAN(1, 1)</code> or <code>TEMP = ATAN(1, DEGREE)</code> Creates a new column named TEMP containing the value 45 (degrees).
<code>TEMP = ATAN(V1)</code> Creates a new column named TEMP, where each value is the arctangent (in radians) of the contents of column V1.
<code>TEMP = ATAN(V1:V3, 1)</code> Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the arctangents of the contents of column V1, the values of the VX column are the arctangents of the contents of column V2, and the values of the VY column are the arctangents of the contents of column V3. All values are in degrees.
<code>TEMP = ATAN(V1[10:20])</code> Creates a new column named TEMP, where the first 11 cells contain the arctangents of the values in rows 10-20 of column V1 (in radians). The other cells in TEMP are empty.
<code>TEMP = ATAN(V1[1:5]:V2)</code> Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the arctangents of the corresponding rows of column V1, and the values in column VX are the arctangents of the corresponding rows of column V2. All values are in radians.

## Related functions

Function	Description
ACOS	Computes the arccosine of the contents of the specified data range
ASIN	Computes the arcsine of the contents of the specified data range
ATAN	Computes the arctangent of the contents of the specified data range
TAN	Computes the tangent of the contents of the specified data range

---

## AVG macro

The AVG macro is available in IBM Campaign and IBM Interact.

### Syntax

AVG(data [, keyword])

### Parameters

data



The numerical values for which to compute the arithmetic mean. These values can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

keyword

This optional keyword determines how the computation is performed over the input data range. Select one of the following keywords:

ALL - Performs the computation on all cells in data (default)

COL - Performs the computation separately for each column of data

ROW - Performs the computation separately for each row of data

For more details on using keywords in IBM Campaign, see "Format Specifications" a pagina 8.

**Nota:** Many macro functions take the keyword parameters {ALL | COL | ROW}. These keywords do not apply in **IBM Campaign** because the input data is always a single column or field. The macro always behaves as if the COL keyword were specified. Therefore, you do not need to specify these keywords when you use **IBM Campaign**.

## Description

AVG calculates the arithmetic mean or average of the cells in the specified data range. The arithmetic mean is calculated by summing the contents of all cells, then dividing the result by the number of cells. The number of columns that are returned by AVG depends on keyword.

- If keyword is ALL, AVG returns one new column, containing a single value (the average of all cells in data).
- If keyword is COL, AVG returns a new column for each input column. Each new column contains one value (the average of all cells in the corresponding input column).
- If keyword is ROW, AVG returns one new column that contains the average across each row of data.

**Nota:** Blank cells are ignored in the calculation.

**Nota:** AVG is the same as the MEAN macro function.

## Examples

```
TEMP = AVG(V1)
```

Creates a column named TEMP containing a single value that is the arithmetic mean of the contents of column V1.

```
TEMP = AVG(V1:V3)
```

Creates a column named TEMP containing a single value that is the arithmetic mean of the contents of columns V1, V2, and V3.

TEMP = AVG(V1[10:20])
Creates a column named TEMP containing a single value that is the arithmetic mean of the cells in rows 10-20 of column V1.
TEMP = AVG(V1[1:5]:V4)
Creates a column named TEMP containing a single value that is the arithmetic mean of the cells in rows 1-5 of columns V1 through V4.
TEMP = AVG(V1:V3, COL)
Creates three new columns named TEMP, VX, and VY. The single value in the TEMP column is the arithmetic mean of the contents of column V1. The single value in the VX column is the arithmetic mean of the contents of column V2. The single value in the VY column is the arithmetic mean of the contents of column V3.
TEMP = AVG(V1[1:5]:V3, COL)
Creates three new columns named TEMP, VX, and VY, each containing a single value. The value in column TEMP is the arithmetic mean of the cells in rows 1-5 of column V1. The value in column VX is the arithmetic mean of the cells in rows 1-5 of column V2. The value in column VY is the arithmetic mean of the cells in rows 1-5 of column V3.
TEMP = AVG(V1, ROW)
Creates a column named TEMP, containing the same values as column V1 (the arithmetic mean of any number is itself).
TEMP = AVG(V1:V3, ROW)
Creates a column named TEMP where each cell entry is the arithmetic mean of the corresponding row across columns V1, V2, and V3.
TEMP = AVG(V1[1:5]:V3, ROW)
Creates a column named TEMP, where the cells in rows 1-5 contain the arithmetic mean of the corresponding row across columns V1 through V3. The other cells in TEMP are empty.

## Related functions

Function	Description
SUM or TOTAL	Computes the sum of a range of cells

---

## BETWEEN macro

The BETWEEN macro is available only in IBM Campaign.

### Syntax

value1 BETWEEN value2 AND value3

### Parameters

Equivalent to value1 >= value2 AND < value3

### Description

BETWEEN is a special variant of the comparison predicate. The details of this predicate are important and the order of the operands has some unexpected implications. See the examples section.

**Nota:** FROM and FOR use identical syntax.

## Examples

10 BETWEEN 5 AND 15 Is true, but: 10 BETWEEN 15 AND 5 Is false:

because the equivalent way of expressing BETWEEN (using AND) has a specific order that does not matter when you are using literals, but might matter a good deal if you provide value2 and value3 by using host variables, parameters, or even subqueries.

---

## BIT\_AND macro

The BIT\_AND macro is available in IBM Campaign and IBM Interact.

### Syntax

```
data1 BIT_AND data2 data1 & data2
```

### Parameters

data1

The non-negative integers to bitwise AND with the values in data2. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

data2

The non-negative integer(s) to bitwise AND with the values in data1. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. The number of columns in data2 must equal the number of columns in data1, unless data2 is a constant. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

BIT\_AND performs a bitwise AND between the two specified data ranges. It returns a new column for each input column, each containing the corresponding column in data1 bitwise AND-ed to the corresponding column of data2 (that is, the first column of data1 is bitwise AND-ed to the first column of data, the second column with the second column, and so on).

If data2 is a constant, each value in data1 is bitwise AND-ed by that value. If data2 contains one or more columns, the calculations are performed on a row-by-row basis between one column from data2 and one column from data1. The first row of data1 is bitwise AND-ed to the first row value of data2, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

**Nota:** Precision for this macro function is limited to integer values less than  $2^{24}$ . No negative values are allowed.

**Nota:** The BIT\_AND operator can be abbreviated with an ampersand (&). Use the ampersand to separate the two arguments (for example, to specify BIT\_AND(V1, 3), you can simply type V1&3).

## Examples

TEMP = 3 BIT_AND 7 or TEMP = 3 & 7
Creates a new column named TEMP containing the value three (bitwise AND of 011 and 111 equals 011).
TEMP = V1 & 8
Creates a new column named TEMP, where each value is the contents of column V1 bitwise AND-ed with the binary value 1000.
TEMP = V1 & V1
Creates a new column named TEMP containing the same contents as the column V1 (every value AND-ed with itself produces itself).
TEMP = V1 & V2
Creates a new column named TEMP, where each value is the row value of column V1 bitwise AND-ed with the corresponding row value of column V2.
TEMP = V1:V3 & V4:V6
Creates three new columns named TEMP, VX, and VY. The column TEMP contains the values in V1 bitwise AND-ed with the corresponding row values of column V4. The column VX contains the bitwise AND-ed values from columns V2 and V5. The column VY contains the bitwise AND-ed values from columns V3 and V6.
TEMP = V1[10:20] & V2 or TEMP = V1[10:20] & V2[1:11]
Creates a new column named TEMP, where the first 11 cells contain the bitwise AND-ed result of the values in rows 10-20 of column V1 by the values in rows 1-11 of column V2. The other cells in TEMP are empty.

## Related functions

Function	Description
BIT_NOT	Computes the bitwise NOT of the contents of the specified data range
BIT_OR	Computes the bitwise OR between two specified data ranges
BIT_XOR or XOR	Computes the bitwise XOR between two specified data ranges

## BIT\_NOT macro

The BIT\_NOT macro is available in IBM Campaign and IBM Interact.

### Syntax

BIT\_NOT data ~ data

### Parameters

data

The non-negative integers to bitwise NOT. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

BIT\_NOT calculates the bitwise NOT of the values in the specified data range. It returns one new column for each input column, each containing the bitwise NOT of the values in the corresponding columns of data.

**Nota:** Precision for this macro function is limited to integer values less than  $2^{24}$ . No negative values are allowed.

**Nota:** Using a column containing the same number  $x$  in each row as data is the same as using the constant  $x$  as data.

**Nota:** The BIT\_NOT operator can be abbreviated with a tilde (~). Use the tilde before the data value (for example, to specify BIT\_NOT(V1), you can simply type ~V1.

## Examples

TEMP = BIT_NOT 3 or TEMP = ~3
Creates a new column named TEMP containing the value four (bitwise NOT of 011 equals 100).
TEMP = ~V1
Creates a new column named TEMP, where each value is the bitwise NOT of the contents of column V1.
TEMP = ~V1:V3
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the bitwise NOT of the contents of column V1, the values of the VX column are the bitwise NOT of the contents of column V2, and the values of the VY column are the bitwise NOT of the contents of column V3.
TEMP = ~V1[100:200]
Creates a new column named TEMP, where the first 101 cells contain the bitwise NOT of the values in rows 1-50 of column V1.

## Related Functions

Function	Description
BIT_AND	Computes the bitwise AND between two specified data ranges
BIT_OR	Computes the bitwise OR between two specified data ranges
BIT_XOR or XOR	Computes the bitwise XOR between two specified data ranges

---

## BIT\_OR macro

The BIT\_OR macro is available in IBM Campaign and IBM Interact.

### Syntax

```
data1 BIT_OR data2 data1 OR data2 data1 | data2
```

### Parameters

data1

The non-negative integers to bitwise OR with the values in data2. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

data2

The non-negative integer(s) to bitwise OR with the values in data1. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. The number of columns in data2 must equal the number of columns in data1, unless data2 is a constant. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

BIT\_OR performs a bitwise OR between the two specified data ranges. It returns a new column for each input column, each containing the corresponding column in data1 bitwise OR-ed to the corresponding column of data2 (that is, the first column of data1 is bitwise OR-ed to the first column of data, the second column with the second column, and so on).

If data2 is a constant, each value in data1 is bitwise OR-ed by that value. If data2 contains one or more columns, the calculations are performed on a row-by-row basis between one column from data1 and one column from data2. The first row of data1 is bitwise OR-ed to the first row value of data2, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

**Nota:** Precision for this macro function is limited to integer values less than  $2^{24}$ . No negative values are allowed.

**Nota:** The BIT\_OR operator can be abbreviated with a vertical bar (|). Use the vertical bar to separate the two columns (for example, to specify BIT\_OR(V1, 3), you can simply type V1|3. You also can use OR.

### Examples

```
TEMP = 3 BIT_OR 7 or TEMP = 3 OR 7 or TEMP = 3 | 7
```

Creates a new column named TEMP containing the value seven (bitwise OR of 011 and 111 equals 111).

TEMP = V1   8
Creates a new column named TEMP, where each value is the contents of column V1 bitwise OR-ed with the binary value 1000.
TEMP = V1   V1
Creates a new column named TEMP containing the same contents as the column V1 (every value OR-ed with itself produces itself).
TEMP = V1   V2
Creates a new column named TEMP, where each value is the row value of column V1 bitwise OR-ed with the corresponding row value of column V2.
TEMP = V1:V3   V4:V6
Creates three new columns named TEMP, VX, and VY. The column TEMP contains the values in V1 logically OR-ed with the corresponding row values of column V4. The column VX contains the logically OR-ed values from columns V2 and V5. The column VY contains the logically OR-ed values from columns V3 and V6.
TEMP = V1[10:20]   V2 or TEMP = V1[10:20]   V2[1:11]
Creates a new column named TEMP, where the first 11 cells contain the bitwise OR-ed result of the values in rows 10-20 of column V1 by the values in rows 1-11 of column V2. The other cells in TEMP are empty.

## Related Functions

Function	Description
BIT_AND	Computes the bitwise AND between two specified data ranges
BIT_NOT	Computes the bitwise NOT of the contents of the specified data range
BIT_XOR or XOR	Computes the bitwise XOR between two specified data ranges

---

## BIT\_XOR macro

The BIT\_XOR macro is available in IBM Campaign and IBM Interact.

### Syntax

```
data1 BIT_XOR data2
```

### Parameters

data1

The non-negative integers to bitwise XOR with the values in data2. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

data2

The non-negative integer(s) to bitwise XOR with the values in data1. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. The number of columns in data2 must equal the number of columns in data1, unless data2 is a constant. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

BIT\_XOR performs a bitwise XOR between the two specified data ranges. It returns a new column for each input column, each containing the corresponding column in data1 bitwise XOR-ed to the corresponding column of data2 (that is, the first column of data1 is bitwise XOR-ed to the first column of data, the second column with the second column, and so on).

If data2 is a constant, each value in data1 is bitwise XOR-ed by that value. If data2 contains one or more columns, the calculations are performed on a row-by-row basis between one column from data1 and one column from data2. The first row of data1 is bitwise XOR-ed to the first row value of data2, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

**Nota:** Precision for this macro function is limited to integer values less than  $2^{24}$ . No negative values are allowed.

## Examples

TEMP = 3 BIT_XOR 7
Creates a new column named TEMP containing the value four (bitwise XOR of 011 and 111 equals 100).
TEMP = V1 BIT_XOR 8
Creates a new column named TEMP, where each value is the contents of column V1, bitwise XOR-ed with the binary value 1000.
TEMP = V1 BIT_XOR V1
Creates a new column named TEMP containing all zeros (every value XOR-ed with itself produces zero).
TEMP = V1 BIT_XOR V2
Creates a new column named TEMP, where each value is the row value of column V1 bitwise XOR-ed with the corresponding row value of column V2.
TEMP = V1:V3 BIT_XOR V4:V6
Creates three new columns named TEMP, VX, and VY. The column TEMP contains the values in V1 bitwise XOR-ed with the corresponding row values of column V4. The column VX contains the bitwise XOR-ed values from columns V2 and V5. The column VY contains the bitwise XOR-ed values from columns V3 and V6.
TEMP = V1[10:20] BIT_XOR V2 or TEMP = V1[10:20] BIT_XOR V2[1:11]
Creates a new column named TEMP, where the first 11 cells contain the bitwise XOR-ed result of the values in rows 10-20 of column V1 by the values in rows 1-11 of column V2. The other cells in TEMP are empty.



## Related functions

Function	Description
BIT_AND	Computes the bitwise AND between two specified data ranges
BIT_NOT	Computes the bitwise NOT of the contents of the specified data range
BIT_OR	Computes the bitwise OR between two specified data ranges

---

## CEILING macro

The CEILING macro is available only in IBM Campaign.

### Syntax

CEILING(data)

### Parameters

data

The numerical values to compute the ceiling of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

CEILING calculates the ceiling of the values in the specified data range. The ceiling of a number is the smallest integer *not* less than the number. CEILING returns one new column for each input column, each containing the ceiling of numbers in the corresponding input column.

### Examples

TEMP = CEILING(4.3)
Creates a new column named TEMP containing the value 5.
TEMP = CEILING(2.9)
Creates a new column named TEMP containing the value -2.
TEMP = CEILING(V1)
Creates a new column named TEMP, where each value is the ceiling of the contents of column V1.
TEMP = CEILING(V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the ceilings of the contents of column V1, the values of the VX column are the ceilings of the contents of column V2, and the values of the VY column are the ceilings of the contents of column V3.

TEMP = CEILING(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the ceilings of the values in rows 10-20 of column V1. The other cells in TEMP are empty.
TEMP = CEILING(V1[50:99]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-50 (the other cells are empty). The values in column TEMP are the ceilings of the rows of column V1, and the values in column VX are the ceilings of the values in column V2.

## Related functions

Function	Description
FLOOR or INT	Computes the floor of each value in the specified data range
FRACTION	Returns the fractional part of each value in the specified data range
TRUNCATE	Returns the non-fractional part of each value in the specified data range

---

## COLUMN macro

The COLUMN macro is available only in IBM Campaign.

### Syntax

COLUMN(data [, data]...) or (data [, data]...)

### Parameters

data

A value to use in creating a column. This can be a constant value (numeric or ASCII text in quotes), a column, a cell range, or an expression evaluating to any of the above. This parameter can be repeated multiple times, but subsequent parameters must have the same dimensionality (that is, column width) as the first parameter. All values in all data parameters must be either numeric or ASCII text (that is, you cannot mix numeric and text values). If multiple data parameters are provided, they all must have the same number of columns. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

COLUMN vertically concatenates its inputs into columns of a function group. It returns the same number of new columns as provided in each input parameter. An unlimited number of arguments can be provided. All arguments must be either numeric or ASCII text strings (that is, you cannot mix numeric and text values).

**Nota:** The COLUMN macro function can be abbreviated by listing the data arguments separated by commas inside parentheses (for example, (for example, TEMP = MEAN((1,2,3,4), ALL). If not used inside another macro function, the pair of parentheses is not necessary (for example, V1=1,2,3 is equivalent to V1=COLUMN(1,2,3).

## Examples

<code>TEMP = COLUMN(3, 4, 5) or TEMP = (3,4,5) or TEMP = 3,4,5</code>
Creates a new column named TEMP with the first three cells containing the values 3, 4, and 5.
<code>TEMP = COLUMN("one", "two", "three")</code>
Creates a new column named TEMP with the first three cells containing the values "one ", "two ", and " three ".
<code>TEMP = AVG(V1), STDV(V1)</code>
Creates a new column named TEMP with the average of column V1 in the first cell and the standard deviation of column V1 in the second cell.
<code>TEMP = V1:V2, V3:V4</code>
Creates two new columns named TEMP and VX where the column TEMP contains the values from column V1 followed by the values from column V3. The column VX contains the values from column V2 followed by the values from column V4.
<code>TEMP = V1:V2, V3:V4</code>
Creates two new columns named TEMP and VX where the column TEMP contains the values from cells 1-10 of column V1 followed by all the values from column V3. The column VX contains the values from cells 1-10 of column V2 followed by all the values from column V4.
<code>TEMP = V1:V2, V3:V4</code>
Creates two new columns named TEMP and VX, each containing a single value. The column TEMP contains the average of columns V1 and V2. The column VX contains the average of columns V3 and V4.

---

## COS macro

The COS macro is available only in IBM Campaign.

### Syntax

`COS(data [, units_keyword])`

### Parameters

`data`

The numerical values to compute the cosine of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

`units_keyword`

This optional keyword determines whether the input values and results are interpreted as degrees or radians. Select one of the following:

**RADIAN** - Performs the calculations in radians (default)

**DEGREE** - Performs the calculations in degrees

If this parameter is not specified, the default is radians. (To convert from radians to degrees, divide by PI and multiply by 180.)

For more details on using keywords in IBM Campaign, see “Format Specifications” a pagina 8.

## Description

COS calculates the cosine of the values in the specified data range. It returns one new column for each input column, each containing the cosine of numbers in the corresponding input column.

## Examples

TEMP = COS(PI) or TEMP = COS(PI, 0) or TEMP = COS(PI, RADIAN)
Returns a new column named TEMP containing a single value of -1.
TEMP = COS(90, 1) or TEMP = COS(90, DEGREE)
Returns a new column named TEMP containing a single value of zero.
TEMP = COS(V1) or TEMP = COS(V1, 0) or TEMP = COS(V1, RADIAN)
Creates a new column named TEMP, where each value is the cosine (in radians) of the contents of column V1.
TEMP = COS(V1:V3, 1)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the cosines of the contents of column V1, the values of the VX column are the cosines of the contents of column V2, and the values of the VY column are the cosines of the contents of column V3. All values are in degrees.
TEMP = COS(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the cosines of the values in rows 10-20 of column V1 (in radians). The other cells in TEMP are empty.
TEMP = COS(V1[1:5]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the cosines of the corresponding rows of column V1, and the values in column VX are the cosines of the corresponding rows of column V2. All values are in radians.

## Related functions

Function	Description
ACOS	Computes the arccosine of the contents of the specified data range
COSH	Computes the hyperbolic cosine of the contents of the specified data range
SIN	Computes the sine of the contents of the specified data range
TAN	Computes the tangent of the contents of the specified data range

---

## COSH macro

The COSH macro is available only in IBM Campaign.

### Syntax

COSH(data [, units\_keyword])

### Parameters

data

The numerical values to compute the hyperbolic cosine of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

units\_keyword

This optional keyword determines whether the input values and results are interpreted as degrees or radians. Select one of the following:

RADIAN - Performs the calculations in radians (default)

DEGREE - Performs the calculations in degrees

If this parameter is not specified, the default is radians. (To convert from radians to degrees, divide by PI and multiply by 180.)

For more details on using keywords in IBM Campaign, see "Format Specifications" a pagina 8.

### Description

COSH calculates the hyperbolic cosine of the values in the specified data range. For  $x$  in radians, the hyperbolic cosine of a number is:

$$\cosh(x) = \frac{e^x + e^{-x}}{2}$$

where  $e$  is the natural number, 2.7182818. COSH returns one new column for each input column, each containing the hyperbolic cosine of numbers in the corresponding input column.

**Nota:** If the value  $x$  is too large, an overflow error is returned. This occurs if  $\cosh(x)$  exceeds the maximum 32-bit floating-point value.

### Examples

TEMP = COSH(0) or TEMP = COSH(0, 0) or TEMP = COSH(0, RADIAN)
---

Returns a new column named TEMP containing the value one.
---

TEMP = COSH(V1)
Creates a new column named TEMP, where each value is the hyperbolic cosine (in radians) of the contents of column V1.
TEMP = COSH(V1:V3, 1) or TEMP = COSH(V1:V3, DEGREE)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the hyperbolic cosines of the contents of column V1, the values of the VX column are the hyperbolic cosines of the contents of column V2, and the values of the VY column are the hyperbolic cosines of the contents of column V3. All values are in degrees.
TEMP = COSH(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the hyperbolic cosines of the values in rows 10-20 of column V1 (in radians). The other cells in TEMP are empty.
TEMP = COSH(V1[1:5]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the hyperbolic cosines of the corresponding rows of column V1, and the values in column VX are the hyperbolic cosines of the corresponding rows of column V2. All values are in radians.

## Related functions

Function	Description
ACOS	Computes the arccosine of the contents of the specified data range
COS	Computes the cosine of the contents of the specified data range
SINH	Computes the hyperbolic sine of the contents of the specified data range
TANH	Computes the hyperbolic tangent of the contents of the specified data range

---

## COT macro

The COT macro is available only in IBM Campaign.

### Syntax

COT(data [, units\_keyword])

### Parameters

data

The numerical values to compute the cotangent of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

units\_keyword

This optional keyword determines whether the input values and results are interpreted as degrees or radians. Select one of the following:

RADIAN - Performs the calculations in radians (default)

DEGREE - Performs the calculations in degrees

If this parameter is not specified, the default is radians. (To convert from radians to degrees, divide by PI and multiply by 180.)

For more details on using keywords in IBM Campaign, see “Format Specifications” a pagina 8.

## Description

COT calculates the cotangent of values in the specified data range. The cotangent is the reciprocal of the tangent. COT returns one new column for each input column, each containing the cotangent of numbers in the corresponding input column.

**Nota:** If a cell contains a value whose tangent is zero, then the arccotangent is infinity. In this case, COT returns the largest 32-bit floating-point number.

## Examples

TEMP = COT(90) or TEMP = COT(90, 0) or TEMP = COT(90, RADIAN)
Returns a new column named TEMP containing the value -0.5.
TEMP = COT(0)
Returns a new column named TEMP containing the value MAX_FLOAT_32.
TEMP = COT(V1, 1) or TEMP = COT(V1, DEGREE)
Creates a new column named TEMP, where each value is the cotangent of the contents (in degrees) of the column V1.
TEMP = COT(V1:V3, 1)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the cotangents of the contents of column V1, the values of the VX column are the cotangents of the contents of column V2, and the values of the VY column are the cotangents of the contents of column V3. All values are in degrees.
TEMP = COT(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the cotangents of the values in rows 10-20 of column V1 (in radians). The other cells in TEMP are empty.
TEMP = COT(V1[1:5]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the cotangents of the corresponding rows of column V1, and the values in column VX are the cotangents of the corresponding rows of column V2. All values are in radians.

## Related functions

Function	Description
ACOT	Computes the arccotangent of the contents of the specified data range
COS	Computes the cosine of the contents of the specified data range

Function	Description
SIN	Computes the sine of the contents of the specified data range
TAN	Computes the tangent of the contents of the specified data range

---

## COUNT macro

The COUNT macro is available only in IBM Campaign.

### Syntax

COUNT(data)

### Parameters

data

The cell range to count the number of cells in. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

COUNT counts the number of values in the specified data range. It returns a new column containing a single value representing the number of cells containing values within the specified data range.

**Nota:** Counting a blank column returns zero.

### Examples

TEMP = COUNT(AVG(V1:V5))
Creates a new column named TEMP containing a single value of one (the function AVG returns a single cell in the default mode).
TEMP = COUNT(V1)
Creates a new column named TEMP containing a single value indicating the number of cells containing values in column V1.
TEMP = COUNT(V1:V3)
Creates a new column named TEMP containing a single value indicating the number of cells containing values in columns V1, V2, and V3.
TEMP = COUNT(V1[10:20])
Creates a new column named TEMP containing the value 11 (ranges are inclusive), given that the cells all contain values.
TEMP = COUNT(V1[1:5]:V4)
Creates a new column named TEMP containing the value 20 (5 cells in each column times 4 columns = 20 cells), given that all the cells contain values.



```
TEMP = COUNT(V1[1:10])
```

Creates a new column named TEMP containing the value 3, given that rows 1-3 of column V1 contain values and rows 4-10 are empty.

## Related functions

Function	Description
SUM or TOTAL	Computes the sum of a range of cells

---

## CURRENT\_DATE macro

The CURRENT\_DATE macro is available in IBM Campaign and IBM Interact.

### Syntax

```
CURRENT_DATE([format])
```

### Parameters

format

One of the keywords in the following table specifying the date format of date\_string.

**Nota:** See "Valid Format Keywords" for more information on available date formats.

### Description

CURRENT\_DATE returns the current date in format. The date is determined by the clock on the IBM server. If no format keyword is supplied, the default of DELIM\_M\_D\_Y is used.

For all recommended databases, IBM Campaign attempts to run the CURRENT\_DATE macro in the database using a database-supported current time SQL call (e.g., SYSDATE, GETDATE, DATE, or TODAY). In these cases, all parameters (including the format of the date) of this macro function are ignored and the output includes whatever is returned by the database (e.g., a time component may be included in the output). If this occurs and you want to return just the date or the date in a different format, you can write your own custom macro using raw SQL or use other IBM macros. For example:

```
DATE_STRING(CURRENT_JULIAN( ), ...)
```

In some cases, the CURRENT\_DATE() macro is run on the IBM Campaign server (e.g., if running against a flat file, against a non-recommended database with no equivalent SQL support, or if the Campaign macro expression cannot be resolved in the database). In these cases, all parameters are recognized and the output is returned in the selected format.

**Nota:** Not all formats available in IBM Campaign are supported by IBM Interact.

Note that you might have to use the DATE\_FORMAT macro to adjust the CURRENT\_DATE for your database type. For example, the following macro works with DB2:

```
table_name = CURRENT_DATE()-1
```

However, for Oracle, you must use the DATE\_FORMAT macro as follows:

```
table_name = DATE_FORMAT(CURRENT_DATE()-1, DELIM_M_D_YYYY, '%Y-%m-%d')
```

## Examples

If the date today is the 13th of September, 2015, CURRENT\_DATE() returns "09/13/15".

## Related functions

Function	Description
DATE_FORMAT	Converts dates from one format to another.
DATE_JULIAN	Returns the Julian date of the input.
DATE_STRING	Returns the date string of the Julian date.
DATE	Converts a date string to Julian date.

---

## CURRENT\_DAY macro

The CURRENT\_DAY macro is available in IBM Campaign and IBM Interact.

### Syntax

```
CURRENT_DAY()
```

### Description

CURRENT\_DAY returns the current day of the month as a number between 1-31. The date is determined by the system clock on the IBM Server.

### Examples

If the date today is the 19th of June, CURRENT\_DAY() will return the number 19.

## Related functions

Function	Description
CURRENT_JULIAN	Returns the Julian number for the current date.
CURRENT_MONTH	Returns the current month as a number.
CURRENT_TIME	Returns the current time as a string.
CURRENT_WEEKDAY	Returns the current weekday as a number.
CURRENT_YEAR	Returns the current year as a number.

---

## CURRENT\_JULIAN macro

The CURRENT\_JULIAN macro is available only in IBM Campaign.

## Syntax

CURRENT\_JULIAN()

## Description

CURRENT\_JULIAN() returns the Julian number for the current date (the number of days elapsed since January, 1, 0000). This is equivalent to the macro DATE(CURRENT\_DATE()).

## Examples

If the date today is the 31st of August, 2000, CURRENT\_JULIAN() returns the number 730729.

## Related functions

Function	Description
CURRENT_DAY	Returns the current day as a number.
CURRENT_MONTH	Returns the current month as a number.
CURRENT_TIME	Returns the current time as a string.
CURRENT_WEEKDAY	Returns the current weekday as a number.
CURRENT_YEAR	Returns the current year as a number.

---

## CURRENT\_MONTH macro

The CURRENT\_MONTH macro is available in IBM Campaign and IBM Interact.

## Syntax

CURRENT\_MONTH()

## Description

CURRENT\_MONTH returns the current month of the year as a number between 1-12.

## Examples

If the date today is the 19th of June, CURRENT\_MONTH() will return the number 6.

## Related functions

Function	Description
CURRENT_DAY	Returns the current day as a number.
CURRENT_JULIAN	Returns the current Julian number.
CURRENT_TIME	Returns the current time as a string.
CURRENT_WEEKDAY	Returns the current weekday as a number.
CURRENT_YEAR	Returns the current year as a number.

---

## CURRENT\_TIME macro

The CURRENT\_TIME macro is available only in IBM Campaign.

### Syntax

CURRENT\_TIME()

### Description

CURRENT\_TIME returns the current time as a string. The time is determined by the system clock on the IBM server.

## Date setting on your web application

To correctly display dates on your web application within current versions of IBM Campaign, your backend server's configuration file must first be correctly configured. This is especially important for the `dDateFormat` and `DateOutputFormatString` parameters for the database containing the system tables. If these are not configured correctly, dates will also display incorrectly in Campaign. You configure these properties using IBM Marketing Platform.

### To set dates for a specific language on your web application

**Nota:** All referenced files are installed by the web application installer unless specifically noted.

**Important:** `webappphome` refers to the directory where the Campaign web application was installed. `language_code` refers to the language setting(s) you choose for your system.

1. Edit the `webappphome/conf/campaign_config.xml` file to ensure that `language_code` is present in the comma-separated list in the `<supportedLocales>` tag, as shown below:  

```
<supportedLocales>en_US, language_code</supportedLocales>
```
2. In the `webappphome/webapp` directory, copy the entire directory tree `en_US` to `language_code` (case sensitive).
3. In `webappphome/webapp/WEB-INF/classes/resources`, copy `StaticMessages_en_US.properties` to `StaticMessages_ language_code.properties`. Also copy `ErrorMessages_en_US.properties` to `ErrorMessages_ language_code.properties`.
4. Edit the `StaticMessages_ language_code.properties`: search for `DatePattern` and change it to read `DatePattern=dd/MM/yyyy` (case sensitive).

**Nota:** This format is defined by Java™. Complete detail about the format can be found in Java documentation for `java.text.SimpleDateFormat` at <http://java.sun.com>. The `StaticMessages.properties` file does not need to be modified.

5. For WebSphere: Re-jar the web application.
6. For WebLogic: Remove the current web application module.
  - a. Add the new module.
  - b. Redeploy the web application.
  - c. Restarting the Campaign listener is not necessary.

7. Ensure that the web browser's language setting has `language_codeset` to the first priority. For more details, see the sections below, *To set your web browser for the correct language* and *To set your computer to display a specific language*.

**Nota:** Be sure to use a hyphen, as opposed to an underscore, in `language_code`. The web application configuration is the only place where a hyphen is used instead of an underscore.

8. Log in to Campaign. Dates should be displayed in Campaign in the format specified in `StaticMessages_language_code.properties`.

For information on how to configure the time for IBM Campaign, see the *IBM Campaign* documentation.

### Examples

If the time is 10:54 a.m., `CURRENT_TIME()` will return the string "10:54:00 AM".

### Related Functions

Function	Description
<code>CURRENT_DAY</code>	Returns the current day as a number.
<code>CURRENT_JULIAN</code>	Returns the current Julian number.
<code>CURRENT_WEEKDAY</code>	Returns the current weekday as a number.
<code>CURRENT_YEAR</code>	Returns the current year as a number.

---

## CURRENT\_WEEKDAY macro

The `CURRENT_WEEKDAY` macro is available in IBM Campaign and IBM Interact.

### Syntax

`CURRENT_WEEKDAY()`

### Description

`CURRENT_WEEKDAY` returns the current day of the week as a number between 0-6. Sunday is represented as 0, Monday as 1, and so on.

### Examples

If today is Friday, `CURRENT_WEEKDAY()` returns the number 5.

### Related functions

Function	Description
<code>CURRENT_DAY</code>	Returns the current day as a number.
<code>CURRENT_JULIAN</code>	Returns the current Julian number.
<code>CURRENT_MONTH</code>	Returns the current month as a number.
<code>CURRENT_TIME</code>	Returns the current time as a string.
<code>CURRENT_YEAR</code>	Returns the current year as a number.

---

## CURRENT\_YEAR macro

The CURRENT\_YEAR macro is available in IBM Campaign and IBM Interact.

### Syntax

CURRENT\_YEAR()

### Description

CURRENT\_YEAR returns the current year as a number.

### Examples

If the current year is 2000, CURRENT\_YEAR() will return the number: 2000.

### Related functions

Function	Description
CURRENT_DAY	Returns the current day as a number.
CURRENT_JULIAN	Returns the current Julian number.
CURRENT_MONTH	Returns the current month as a number.
CURRENT_TIME	Returns the current time as a string.
CURRENT_WEEKDAY	Returns the current weekday as a number.
MONTHOF	Returns the month of the year as a number.
WEEKDAYOF	Returns the weekday of the week as a number.
YEAROF	Returns the year as a number.

---

## DATE

### Syntax

DATE(input\_date, [input\_date format])

### Parameters

date\_string

A string of text representing a valid date.

format

Optional, one of the keywords in the table under the "Valid Date Format Keywords," specifying the date format of date\_string.

### Description

The Interact DATE macro converts an input date into a format-neutral integer value.

The DATE macro is computed as follows: DATE (X) = 365 + the number of whole days elapsed from noon on January 1, 0001 A.D. To the DATE (X), an optional input DATE format keyword can be provided to specify how to parse the input

DATE. If no format keyword is supplied, the default of DELIM\_M\_D\_Y is used. For more information, see Valid Date Format keywords for additional information on valid date formats.

Date formats are either fixed-width (for example, the date February 28, 1970 is represented as 02281970 in MMDDYYYY format), or delimited (for example, February 28, 1970, 2-28-1970, or 02/28/1970 in the DELIM\_M\_D\_YY format).

In delimited formats, delimiters are slash (/), dash(-), space ( ), comma (,), or colon (:); years can be represented by either 2 or 4 digits; and months can be fully spelled out (for example, February), abbreviated (for example, Feb), or numeric (for example, 2 or 02).

For all years specified as two-digits:

- By default, Interact assumes that delimited two-digit dates are between the years of 1920-2020
- Two-digit years less than the millennium cutoff (default is 20, but can be set by the JVM parameter) are considered to be in the 2000's.
- Two-digit years greater than or equal to the threshold are considered to be in the 1900's.

**Nota:**

- Not all DATE Formats available in Campaign are supported by Interact.
- For more information on two-digit years, see Valid Date Format keywords.
- For more information on configuring the millennium cutoff for two-digit years, see the JVM Arguments section in the Interact Tuning Guide.

This macro is available in IBM Interact.

Many business systems use Julian Date offsets. The result of Interact DATE() macro is related to the Julian Date as follows:

Julian Date = DATE(...) + 1,721,059 + fraction of day elapsed since previous noon.

Useful DATE() values for the A.D. period include:

- January 1, 2050 A.D returns 748,749.
- January 1, 2000 A.D returns 730,486
- January 1, 1990 A.D returns 726,834
- January 1, 1900 A.D returns 693,962
- January 1, 0001 A.D returns 365

**Nota:** In accordance with the ISO 8601 standard and XML schema definition for Date and the DateTime objects, the proleptic Gregorian calendar is used to compute the count of days elapsed. In this calendaring system, the hypothetical year 0000 A.D. is synonymous with 0001 B.C.

## Examples

DATE("8/31/2000") returns the number 730,729.

DATE("8/31/2000",DELIM\_MM\_DD\_YYYY) returns the number 730,729.

DATE("2015-01-01",DELIM\_Y\_M\_D) returns the number 735,965.

DATE("01",DD), DATE("0101",MMDD) and DATE("1970-01-01",DELIM\_Y\_M\_D) return the number 719,529.

## Related Functions

Function	Description
DATE_FORMAT	Converts dates from one format to another.
DATE_JULIAN	Returns the Julian date of the input.
DATE_STRING	Returns the date string of the Julian date.
CURRENT_DATE	Returns the current date in a specified format.

---

## DATE\_FORMAT macro

The DATE\_FORMAT macro is available in IBM Campaign and IBM Interact.

### Syntax

DATE\_FORMAT(date\_string, input\_format, output\_format)

### Parameters

date\_string

A text representing a valid date.

input\_format

One of the keywords in the table below specifying the date format of date\_string.

output\_format

One of the keywords in the table below specifying the wanted output date format.

### Description

DATE\_FORMAT() transforms a date of input\_format to another format output\_format.

If the date is fixed-width, it must be set to one of the following values:

- DDMMYY[YY]
- DDMMMYY[YY]
- MMDDYY[YY]
- MMMDDYY[YY]
- YY[YY]MMDD
- YY[YY]MMMDD

MM is a 2-digit month and MMM is the 3-character month abbreviation.

If the date is delimited (any delimiter can be used including SPACE, DASH, SLASH), it must be set to one of these values:

- DELIM\_D\_M\_Y
- DELIM\_M\_D\_Y



- DELIM\_Y\_M\_D

**Nota:** Not all formats available in IBM Campaign are supported by IBM Interact.

### Examples

DATE\_FORMAT("012171", MMDDYY, MMDDYYYY) returns the string "01211971".

**Nota:** See "DATE" a pagina 50 for additional information on valid date formats.

Related Functions

Function	Description
DATE	Converts a date string to a Julian date.
DATE_JULIAN	Returns the Julian date of the input.
DATE_STRING	Returns the date string of the Julian date.

---

## DATE\_JULIAN macro

The DATE\_JULIAN macro is available only in IBM Campaign.

### Syntax

DATE\_JULIAN(year, month, day)

### Parameters

year

Valid 2-digit or 4-digit year number.

month

Valid month number between 1-12.

day

Valid day number between 1-31.

### Description

DATE\_JULIAN returns the Julian date of the specified input. The Julian date is the number of days elapsed since January 1, 0000.

### Examples

DATE\_JULIAN (2000,08,31) returns the number 730729.

### Related functions

Function	Description
DATE	Converts a date string to a Julian date.
DATE_FORMAT	Converts dates from one format to another.

Function	Description
DATE_STRING	Returns the date string of the Julian date.

---

## DATE\_STRING macro

The DATE\_STRING macro is available only in IBM Campaign.

### Syntax

```
DATE_STRING(julian_date [, 'output_format'[, max_length]])
DATE_STRING(julian_date [, 'format_string'[, max_length]])
```

### Parameters

julian\_date

A number representing a Julian date, the number of days elapsed since January 1, 0000.

output\_format

String, valid date format.

max\_length

format\_string

A format string optionally including any combination of the following format codes:

Code	Description
%a	Abbreviated weekday name
%A	Full weekday name
%b	Abbreviated month name
%B	Full month name
%c	Date and time representation appropriate for locale
%d	Day of month (01 - 31)
%H	Hour in 24-hour format (00 - 23)
%I	Hour in 12-hour format (01 - 12)
%j	Day of year (001 - 366)
%m	Month (01 - 12)
%M	Minute (00 - 59)
%p	Current locale's AM/PM indicator for 12-hour clock
%S	Second (00 - 59)
%U	Week of year, with Sunday as first day of week (00 - 51)
%w	Weekday (0 - 6; Sunday is 0)

Code	Description
%W	Week of year, with Monday as first day of week (00 - 51)
%x	Date representation for current locale
%X	Time representation for current locale
%y	2-digit year (00 - 99)
%Y	4-digit year. The preceding zeros in the year are not truncated. For example, the year 0201 is displayed as 0201, and the year 0001 is displayed as 0001.
%4Y	4-digit year. The preceding zeros in the year are not truncated. For example, the year 0201 is displayed as 0201, and the year 0001 is displayed as 0001.
%z, %Z	Time zone name or abbreviation; no output if time zone is unknown
%%	Percent sign

## Description

DATE\_STRING returns the date string of the Julian date. If output\_format is not provided, the default keyword DELIM\_M\_D\_Y will be used.

## Examples

DATE\_STRING(730729) returns the string "08/31/00".

**Nota:** See "DATE" a pagina 50 for additional information on valid date formats.

## Related functions

Function	Description
DATE	Converts a date string to a Julian date.
DATE_JULIAN	Returns the Julian date of the input.
DATE_FORMAT	Converts dates from one format to another.

---

## DAY\_BETWEEN macro

The DAY\_BETWEEN macro is available only in IBM Campaign.

### Syntax

```
DAY_BETWEEN(from_date_string, to_date_string [, input_format])
```

### Parameters

from\_date\_string

A text representing a valid date from which to count the number of days elapsed.

to\_date\_string

A text representing a valid date to which the number of days is counted. This date must be in the same format as `from_date_string`.

`input_format`

One of the keywords in the table below, specifying the date format of `from_date_string` and `to_date_string`.

### Description

`DAY_BETWEEN` returns the number of days between `from_date_string` and `to_date_string`. If `input_format` is not provided, the default keyword `DELIM_M_D_Y` will be used.

### Examples

`DAY_BETWEEN("08/25/00","08/31/00")` returns the number 6.

**Nota:** See "DATE" a pagina 50 for additional information on valid date formats.

### Related functions

Function	Description
<code>DAY_FROMNOW</code>	Returns the number of days between the current day and a specified date.
<code>DAY_INTERVAL</code>	Returns the number of days between two specified dates.

---

## DAY\_FROMNOW macro

The `DAY_FROMNOW` macro is available only in IBM Campaign.

### Syntax

`DAY_FROMNOW(to_year, to_month, to_day)`

### Parameters

`to_year`

Valid 2-digit or 4-digit year number.

`to_month`

Valid month number between 1-12.

`to_day`

Valid day number between 1-31.

### Description

`DAY_FROMNOW` returns the number of days between the current day and the date specified by `to_year/to_month/to_day`.

**Nota:** If the specified date is in the past, the returned value will be negative.

## Examples

If today's date is the 31st of August, 2000, `DAY_FROMNOW(2000,12,31)` returns the number 122.

## Related functions

Function	Description
<code>DAY_BETWEEN</code>	Returns the number of days between two specified date strings.
<code>DAY_INTERVAL</code>	Returns the number of days between two specified dates.

---

## DAY\_INTERVAL macro

The `DAY_INTERVAL` macro is available only in IBM Campaign.

### Syntax

`DAY_INTERVAL(from_year, from_month, from_day, to_year, to_month, to_day)`

### Parameters

`from_year`

Valid 2-digit or 4-digit year number.

`from_month`

Valid month number between 1-12.

`from_day`

Valid day number between 1-31.

`to_year`

Valid 2-digit or 4-digit year number.

`to_month`

Valid month number between 1-12.

`to_day`

Valid day number between 1-31.

### Description

`DAY_INTERVAL` returns the number of days between the specified from date (`from_year/from_month/from_day`) and the specified to date (`to_year/to_month/to_day`).

## Examples

DAY\_INTERVAL(2000,8,31,2000,12,31) returns the number 122.

## Related functions

Function	Description
DAY_BETWEEN	Returns the number of days between two specified date strings.
DAY_FROMNOW	Returns the number of days between the current day and a specified date.

---

## DAYOF macro

The DAYOF macro is available only in IBM Campaign.

### Syntax

DAYOF(date\_string [, input\_format])

### Parameters

date\_string

A text representing a valid date.

input\_format

One of the keywords in the table below, specifying the date format of date\_string.

### Description

DAYOF returns the day of the month as a number for the date represented by the date\_string. If input\_format is not provided, the default keyword DELIM\_M\_D\_Y will be used.

### Examples

DAYOF("08/31/00") returns the number 31.

**Nota:** See "DATE" a pagina 50 for additional information on valid date formats.

---

## DISTANCE macro

The DISTANCE macro is available in IBM Campaign and IBM Interact.

### Syntax

DISTANCE(lat1, long1, lat2, long2[, UNIT\_OF\_MEASURE][, PRECISION])

### Parameters

lat1

The latitude of the first point, as a decimal value.

long1

The longitude of the first point, as a decimal value.

lat2

The latitude of the second point, as a decimal value.

long2

The longitude of the second point, as a decimal value.

UNIT\_OF\_MEASURE

An optional parameter indicating the unit of measure for the returned distance. Values are MILES or KILOMETERS. If you omit this parameter, MILES is the default.

PRECISION

An optional parameter indicating the level of precision following the decimal point for the returned distance. If you specify a precision value, the returned distance is truncated to the number of decimal places you specify. The maximum value is 5. If you omit this value, the number of decimal places is not truncated.

## Description

DISTANCE calculates the distance between two points. Latitude and longitude are expected to be in decimal units. Always use a comma and a space to separate numeric values. This is necessary to accommodate languages that use a comma as a decimal separator, as shown in the second example below.

## Examples

DISTANCE (18.529747, 73.839798, 18.533511, 73.8777995, MILES, 2) returns the value 2.50 Miles.

DISTANCE (18,529747, 73,839798, 18,533511, 73,8777995, KILOMETERS, 1) returns the value 4,0 kilometers.

---

## DIV macro

The DIV macro is available in IBM Campaign and IBM Interact.

### Syntax

data DIV divisor data / divisor

### Parameters

data

The numerical values to divide into. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

divisor

The value(s) to divide the values in the specified data range by. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. The number of columns in data2 must equal the number of columns in data1, unless data2 is a constant. For the format definition of divisor (same as data), see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

DIV divides the specified data range by the divisor value. It returns a new column for each input column, each containing the corresponding column in data1 divided by the corresponding column of data2 (that is, the first column of data1 is divided by to the first column of data, the second column with the second column, and so on).

If data2 is a constant, each value in data1 is divided by that value. If data2 contains one or more columns, the calculations are performed on a row-by-row basis between one column from data1 and one column from data2. The first row of data1 is divided by the first row value of data2, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

**Nota:** Using a column containing the same number  $x$  in each row as divisor is the same as using the constant  $x$  as divisor.

**Nota:** The DIV operator can be abbreviated with a slash (/).

## Examples

TEMP = 8 DIV 4 or TEMP = 8/4
Creates a new column named TEMP containing the value two.
TEMP = V1/8
Creates a new column named TEMP, where each value is the contents of column V1 divided by eight.
TEMP =V1:V3/2
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the contents of column V1 divided by two, the values of the VX column are the contents of column V2 divided by two, and the values of the VY column are the contents of column V3 divided by two.
TEMP = V1/V1
Creates a new column named TEMP containing all ones (since any number divided by itself is one).
TEMP = V1/V2
Creates a new column named TEMP, where each value is the row value of column V1 divided by the corresponding row value of column V2.
TEMP = V1:V3/V4:V6
Creates three new columns named TEMP, VX, and VY. The column TEMP contains the values in V1 divided by the corresponding row values of column V4. The column VX contains the division of column V2 by V5. The column VY contains the division of column V3 by V6.



TEMP = V1[10:20] / V2 or TEMP = V1[10:20] / V2[1:11]

Creates a new column named TEMP, where the first 11 cells contain the result of dividing the values in rows 10-20 of column V1 by the values in rows 1-11 of column V2. The other cells in TEMP are empty.

## Related functions

Function	Description
MOD	Computes the modulo of the contents of the specified data range
MULT	Multiplies the contents of two data ranges
POW	Computes a base value raised to the specified exponential powers

---

## EQ macro

The EQ macro is available in IBM Campaign and IBM Interact.

### Syntax

data1 EQ data2 data1 == data2 (data1 = data2)

### Parameters

data1

The cell range to compare. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

data2

The number(s) to compare all values in the specified column against. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. The number of columns in data2 must equal the number of columns in data1, unless data2 is a constant. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

EQ compares the two specified data ranges, returning a one if the values are equal or a zero if they are not equal. It returns a new column for each input column, each containing the corresponding column in data1 compared to the corresponding column of data2 (that is, the first column of data1 is compared to the first column of data, the second column with the second column, and so on).

If data2 is a constant, each value in data is compared to that value. If data2 is a column, the calculations are performed on a row-by-row basis. The values in data1 are compared to the first row value of data2, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

When comparing strings, case does not matter (that is, "Yes", "YES", "yes", and "yeS" are all considered equal).

**Nota:** The EQ operator can be abbreviated with a double equal sign (==). Inside parentheses, a single equal sign (=) also can be used for the EQ macro function (outside parentheses, the equal sign is interpreted as the assignment operator).

## Examples

TEMP = 3 EQ 4 or TEMP = 3==4 or TEMP = (3=4)
Creates a new column named TEMP containing the value zero (since three is not equal to four).
TEMP = "No" == "NO"
Creates a new column named TEMP containing the value one (string compares are case insensitive).
TEMP = V1 == 8
Creates a new column named TEMP, where each value is one if the corresponding row value of the column V1 is equal to the number eight, otherwise zero.
TEMP = V1==V1
Creates a new column named TEMP containing all ones (since every number is equal to itself).
TEMP = V1==V2
Creates a new column named TEMP, where each value is the row value of column V1 compared to the corresponding row value of column V2.
TEMP = V1:V3 == V4:V6
Creates three new columns named TEMP, VX, and VY. The column TEMP contains the values in V1 compared to the corresponding row values of column V4. The column VX compares columns V2 and V5. The column VY compares columns V3 and V6.
TEMP = V1[10:20] == V2 or TEMP = V1[10:20] == V2[1:11]
Creates a new column named TEMP, where the first 11 cells contain the results of comparing the values in rows 10-20 of column V1 to rows 1-11 of column V2. The other cells in TEMP are empty.

## Related functions

Function	Description
EQ	Returns TRUE if one data range is equal to another
GE	Returns TRUE if one data range is greater than or equal to another
GT	Returns TRUE if one data range is greater than another
LE	Returns TRUE if one data range is less than or equal to another
LT	Returns TRUE if one data range is less than another
NE	Returns TRUE if one data range is not equal to another

---

## EXP macro

The EXP macro is available only in IBM Campaign.

### Syntax

EXP(data)

### Parameters

data

The numerical values used as an exponent to the natural number,  $e$ . This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

EXP raises the natural number,  $e$ , by each of the values in the specified data range (that is, calculates  $e^x$ ). The constant  $e$  equals 2.7182818. EXP returns one new column for each input column, each containing the result  $e^x$  for each value  $x$  in the corresponding input column(s). EXP is the inverse of the LN macro function.

**Nota:** If the value  $x$  is too large or too small, an overflow error is returned. This occurs if  $e^x$  exceeds the maximum or minimum 32-bit floating-point value.

### Examples

TEMP = EXP(2)
Creates a new column named TEMP containing the value 7.39.
TEMP = EXP(V1)
Creates a new column named TEMP, where each value is result of raising $e$ to the contents of column V1.
TEMP = EXP(V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the results of raising $e$ to the column V1, the values of the VX column are the results of raising $e$ to the contents of column V2, and the values of the VY column are the results of raising $e$ to the contents of column V3.
TEMP = EXP(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the results of raising $e$ to the values in rows 10-20 of column V1. The other cells in TEMP are empty.
TEMP = EXP(V1[1:5]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the results of raising $e$ to the corresponding row values of column V1, and the values in column VX are the results of raising $e$ to the corresponding row values of column V2.

## Related functions

Function	Description
LN or LOG	Computes the natural log of the contents of the specified data range
LOG2	Computes the log base2 of the contents of the specified data range
LOG10	Computes the log base10 of the contents of the specified data range
POW	Exponential power

---

## EXTERNALCALLOUT macro

The EXTERNALCALLOUT macro is available only in IBM Interact.

### Syntax

```
EXTERNALCALLOUT( calloutName, arg1, ...)
```

### Parameters

*calloutName*

The name of the callout you created using the ExternalCallout API. This name must match the name of the External Callout category you created in IBM Marketing Platform.

*arg1*

An argument required by your callout, if required.

### Description

EXTERNALCALLOUT enables you to call an external application to add data to your interactive flowchart. EXTERNALCALLOUT can return whatever you have created the callout to do. You must write this callout in Java using the ExternalCallout API. For more details, see the *IBM Interact Administrator's Guide*.

### Examples

```
EXTERNALCALLOUT(getStockPrice, UNCA)
```

Calls the callout `getStockPrice` passing the name of the stock, `UNCA`, as the argument. This user defined callout returns the stock price as defined by the callout.

---

## FACTORIAL macro

The FACTORIAL macro is available only in IBM Campaign.

### Syntax

```
FACTORIAL(data)
```

## Parameters

data

The integer values to compute the factorial for. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above, but must be greater than or equal to zero. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

FACTORIAL calculates the factorial of the values in the specified data range. All inputs must be integers greater than or equal to zero. The factorial of an integer less than or equal to one is one. For integers  $x \geq 2$ , the factorial  $x! = x(x-1)(x-2)\dots(x-(x-1))$ . FACTORIAL returns one new column for each input column, each containing the factorial of numbers in the corresponding input column.

**Nota:** Any value greater than 34 will produce ??? (floating-point overflow error).

## Examples

TEMP = FACTORIAL(3)
Creates a new column named TEMP containing the value 6.
TEMP = FACTORIAL(-2)
Generates an error 333, indicating that the argument must be greater than or equal to 0.
TEMP = FACTORIAL(V1)
Creates a new column named TEMP, where each value is the factorial of the contents of column V1.
TEMP = FACTORIAL(V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the factorials of the contents of column V1, the values of the VX column are the factorials of the contents of column V2, and the values of the VY column are the factorials of the contents of column V3.
TEMP = FACTORIAL(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the factorials of the values in rows 10-20 of column V1. The other cells in TEMP are empty.
TEMP = FACTORIAL(V1[50:99]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-50 (the other cells are empty). The values in column TEMP are the factorials of the rows of column V1, and the values in column VX are the factorials of the values in column V2.

---

## FLOOR macro

The FLOOR macro is available only in IBM Campaign.

### Syntax

FLOOR(data)

## Parameters

data

The numerical values to compute the floor of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

FLOOR calculates the floor of the values in the specified data range. The floor of a number is the greatest integer less than the number. FLOOR returns one new column for each input column, each containing the floor of numbers in the corresponding input column.

**Nota:** This is the same as the INT macro function.

## Examples

TEMP = FLOOR(4.3)
Creates a new column named TEMP containing the value 4.
TEMP = FLOOR(2.9)
Creates a new column named TEMP containing the value -3.
TEMP = FLOOR(V1)
Creates a new column named TEMP, where each value is the floor of the contents of column V1.
TEMP = FLOOR(V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the floors of the contents of column V1, the values of the VX column are the floors of the contents of column V2, and the values of the VY column are the floors of the contents of column V3.
TEMP = FLOOR(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the floors of the values in rows 10-20 of column V1. The other cells in TEMP are empty.
TEMP = FLOOR(V1[50:99]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-50 (the other cells are empty). The values in column TEMP are the floors of the rows of column V1, and the values in column VX are the floors of the values in column V2.

## Related functions

Function	Description
CEILING	Computes the ceiling of each value in the specified data range
FRACTION	Returns the fractional part of each value in the specified data range
TRUNCATE	Returns the non-fractional part of each value in the specified data range

---

## FORMAT macro

The FORMAT macro is available only in IBM Campaign.

### Syntax

Format has two forms, one for numeric datatypes and one for text/character datatypes.

For numeric datatypes:

```
FORMAT(colName, width [, precision [, format_type [, alignment [, padding]]]])
```

For text/character datatypes:

```
FORMAT(colName, width [, alignment])
```

### Parameters

colName

The macro examines colName and determines its datatype, then imposes the appropriate rules for subsequent parameters accordingly.

width

Width should be large enough to hold the complete result, otherwise the result will be truncated. Acceptable values are from 1 to 29 if colName is numeric, otherwise from 1 to 255.

precision

Precision is number of digits after the decimal point. Acceptable values are from 0 to 15. If it's zero, then the result is integer. Default precision value is 2.

format\_type

Valid keywords for format\_type are:

PERIOD	Period(.) is used as decimal symbol. No digit grouping symbol is used. This is the default value.
COMMA	Comma(,) is used as decimal symbol. No digit grouping symbol is used.
PERIOD_COMMA	Period as decimal symbol and comma as digit grouping symbol.
COMMA_PERIOD	Comma as decimal symbol and period as digit grouping symbol.

alignment

Valid keywords for alignment are LEFT and RIGHT. Default value is RIGHT for numeric datatypes and LEFT for text/character datatypes.

padding

Valid keywords for padding are SPACE and ZERO. Default value is SPACE. ZERO is ignored (and instead SPACE is used) if alignment is LEFT.

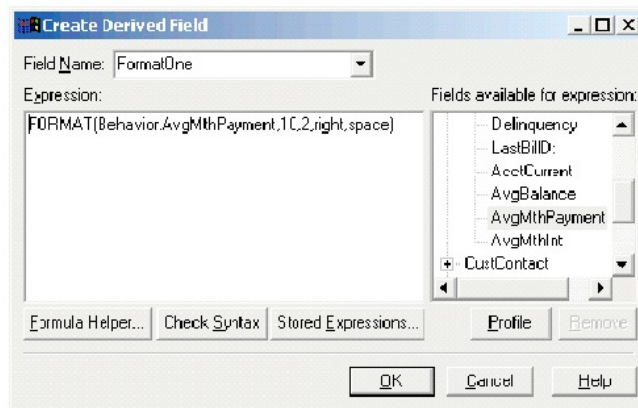
Note that numeric strings held within a text/character datatype are treated as text/character. Also note that the numeric form takes multiple optional keywords, each with a default value. However, to override the default of second or subsequent optional keywords you MUST code the defaults for the preceding optional keywords (in effect they become required). For example: to override alignment to be LEFT you must code: `FORMAT(myNumCol, 10, 2, PERIOD, LEFT)`.

## Description

FORMAT converts numeric data to a string form with various formatting options to control and define the output string. This will be especially useful for creating Snapshot files with specific formats for mailing file purposes.

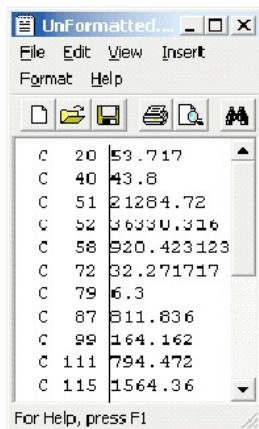
## Examples

The following example defines a derived field using FORMAT.



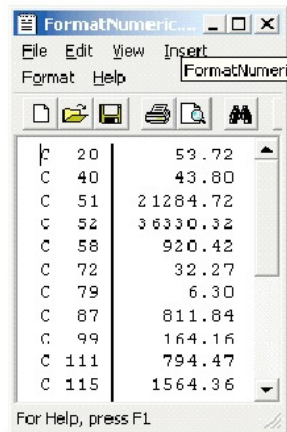
The following examples show the same field, AvgMthPayment, in three formats.

Unformatted:



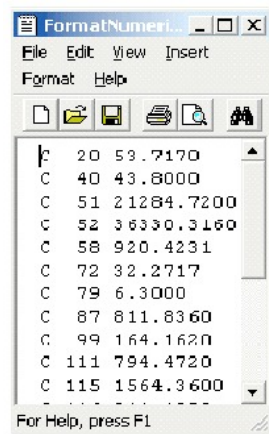


Formatted using `FORMAT(Behavior.AvgMthPayment,10,2,right,space)`:



C	20	53.72
C	40	43.80
C	51	21284.72
C	52	36330.32
C	58	920.42
C	72	32.27
C	79	6.30
C	87	811.84
C	99	164.16
C	111	794.47
C	115	1564.36

Formatted using `FORMAT(Behavior.AvgMthPayment,10,4)`:



C	20	53.7170
C	40	43.8000
C	51	21284.7200
C	52	36330.3160
C	58	920.4231
C	72	32.2717
C	79	6.3000
C	87	811.8360
C	99	164.1620
C	111	794.4720
C	115	1564.3600

---

## FRACTION macro

The FRACTION macro is available only in IBM Campaign.

### Syntax

`FRACTION(data)`

### Parameters

data

The numerical values to compute the fraction of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

FRACTION calculates the fractional part of the values in the specified data range. It returns one new column for each input column, each containing the fractional part of the numbers in the corresponding input column.

**Nota:** The FRACTION macro function and the TRUNCATE macro function are complementary in that they sum to the original values.

## Examples

TEMP = FRACTION(4.3)
Creates a new column named TEMP containing the value 0.3.
TEMP = FRACTION(2.9)
Creates a new column named TEMP containing the value -0.9.
TEMP = FRACTION(V1)
Creates a new column named TEMP, where each value is the fractional part of the contents of column V1.
TEMP = FRACTION(V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the fractional parts of the contents of column V1, the values of the VX column are the fractional parts of the contents of column V2, and the values of the VY column are the fractional parts of the contents of column V3.
TEMP = FRACTION(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the fractional parts of the values in rows 10-20 of column V1. The other cells in TEMP are empty.
TEMP = FRACTION(V1[50:99]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-50 (the other cells are empty). The values in column TEMP are the fractional parts of the rows of column V1, and the values in column VX are the fractional parts of the values in column V2.

## Related functions

Function	Description
CEILING	Computes the ceiling of each value in the specified data range
FLOOR	Computes the floor of each value in the specified data range
TRUNCATE	Returns the non-fractional part of each value in the specified data range

---

## GE macro

The GE macro is available in IBM Campaign and IBM Interact.

### Syntax

data1 GE data2 data1 >= data2

## Parameters

data1

The numerical cell range to compare. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

data2

The number(s) to compare all values in the specified column against. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. The number of columns in data2 must equal the number of columns in data1, unless data2 is a constant. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

GE compares the two specified data ranges, returning a one if the values in the first data set are greater than or equal to the values in the second data set or a zero otherwise. It returns a new column for each input column, each containing the corresponding column in data1 compared to the corresponding column of data2 (that is, the first column of data1 is compared to the first column of data, the second column with the second column, and so on).

If data2 is a constant, each value in data is compared to that value. If data2 is a column, the calculations are performed on a row-by-row basis. The values in data1 are compared to the first row value of data2, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

**Nota:** The GE operator can be abbreviated with a greater than sign followed by an equal sign (>=).

## Examples

```
TEMP = 9 GE 4 or TEMP = 9 >= 4
```

Creates a new column named TEMP containing the value one (since nine is greater than four).

```
TEMP = V1 >= 8
```

Creates a new column named TEMP, where each value is one if the corresponding row value of the column V1 is greater than or equal to the number eight, otherwise zero.

```
TEMP = V1:V3 >= 2
```

Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the contents of column V1 compared to the value two, the values of the VX column are the contents of column V2 compared to the value two, and the values of the VY column are the contents of column V3 compared to the value two.

```
TEMP = V1 >= V1
```

Creates a new column named TEMP containing all ones (since every number is equal to itself).

TEMP = V1 >= V2
Creates a new column named TEMP, where each value is the row value of column V1 compared to the corresponding row value of column V2.
TEMP = V1:V3 >= V4:V6
Creates three new columns named TEMP, VX, and VY. The column TEMP contains the values in V1 compared to the corresponding row values of column V4. The column VX compares columns V2 and V5. The column VY compares columns V3 and V6.
TEMP = V1[10:20] >= V2 or TEMP = V1[10:20] >= V2[1:11]
Creates a new column named TEMP, where the first 11 cells contain the results of comparing the values in rows 10-20 of column V1 to the values in rows 1-11 of column V2. The other cells in TEMP are empty.

## Related functions

NE	Returns TRUE if one data range is not equal to another
----	--

---

## GROUPBY macro

The GROUPBY macro is available only in IBM Campaign.

### Syntax

GROUPBY(group\_field, keyword, rolled\_field [,output\_field])

### Parameters

- group\_field  
Specifies the variable over which records are grouped (that is, all the same values of the specified variable are grouped together).
- keyword  
Specifies the summary roll-up function to perform on the rolled-field.
- rolled\_field  
Specifies the variable to be summarized or rolled up.
- output\_field  
Identifies an alternate variable to be returned for a single row of a group and can be used only with the keywords MinOf, MaxOf, and MedianOf.

### Description

GROUPBY summarizes across multiple rows of data within a group. The output of this function is a single column. The output is the result of the operation specified by keyword on the rolled\_field over the homogeneous group specified by the group\_field. If there is more than one answer satisfying a specified condition, the first one encountered is returned.

If the optional output\_field is not supplied, then the output is the result of the operation on rolled\_field. If output\_field is supplied, then the result is the output\_field of the row within the group.

If there are multiple rows within a group that satisfy the specified condition (for example, there are ties for the max value), the output-field associated with the first row satisfying the condition is returned.

**Nota:** To work with grouping over multiple columns, you can enclose a list of field names, separated by commas, within a set of "curly" brackets "{}" and using this as the first parameter in the GROUPBY macro call.

Supported keywords are as follows (case insensitive):

<b>Keyword</b>	<b>String? Yes/No</b>	<b>Description</b>
CountOf	Yes	Returns the number of records in each group (rolled_field can be numeric or string; the returned value is the same regardless of the value of rolled_field).
MinOf	Yes	Returns the minimum value of rolled_field in each group (rolled_field can be numeric or string; if rolled_field is a string, the value closest to the beginning of the alphabet where alphabetically sorted is returned).
MaxOf	Yes	Returns the maximum value of rolled_field in each group (rolled_field can be numeric or string; if rolled_field is a string, the value closest to the end of the alphabet when alphabetically sorted is returned).
DiffOf	Yes	Returns the number of distinct values of rolled_field in each group (rolled_field can be numeric or string).
AvgOf	No	Returns the average value of rolled_field in each group (rolled_field must be numeric).
ModeOf	Yes	Returns the modal value (that is, the most commonly occurring value) of rolled_field in each group (rolled_field can be numeric or string).

<b>Keyword</b>	<b>String? Yes/No</b>	<b>Description</b>
MedianOf	Yes	Returns the median value (that is, the middle value when sorted by rolled_field) of rolled_field in each group (rolled_field can be numeric or string; if rolled_field is a string, the values are sorted alphabetically).
OrderOf	Yes	Returns the order of rolled_field in each group (rolled_field must be numeric). If multiple records have the same value, they all receive the same value.
SumOf	No	Returns the sum of rolled_field in each group (rolled_field must be numeric).
StdevOf	No	Returns the standard deviation of rolled_field in each group (rolled_field must be numeric).
IndexOf	Yes	Returns the 1-based index (ordered by rolled_field) of each record (rolled_field can be numeric or string). The sort order is ascending.  Note: For numeric fields, the sort order of RankOf and IndexOf can be made descending by putting a minus sign (-) in front of the sort field.
RankOf	Yes	Returns the 1-based category (ordered by rolled_field) in which each record lies (rolled_field can be numeric or string). The sort order is ascending.  Note: For numeric fields, the sort order of RankOf and IndexOf can be made descending by putting a minus sign (-) in front of the sort field.

## Examples

GROUPBY (Household_ID, SumOf, Account_Balance)
Computes the sum of all account balances by household.
GROUPBY (Cust_ID, MinOf, Date(Account_Open_Date), Acc_Num)
Returns the account number of first account opened by customer.

---

## GROUPBY\_WHERE macro

The GROUPBY\_WHERE macro is available only in IBM Campaign.

### Syntax

GROUPBY\_WHERE(group\_field, keyword, rolled\_field, where\_value  
[,output\_field])

### Parameters

- group\_field  
Specifies the variable over which records are grouped (that is, all the same values of the specified variable are grouped together).
- keyword  
Specifies the summary roll-up function to perform.
- rolled\_field  
Specifies the variable to be summarized or rolled up.
- where\_value  
An expression that evaluate to a one or zero value that specifies which rows are to be included in the roll-up operation.
- output\_field  
Identifies an alternate variable to be returned for a single row of a group and can be used only with the keywords MinOf, MaxOf, and MedianOf

### Description

GROUPBY\_WHERE summarizes across specific rows of data within a group. The output of this function is a single column. The output is the result of the operation specified by keyword on the rolled\_field over the homogeneous group specified by the group\_field, filtered by the where\_value. Only rows with a where\_value of one are included in the calculation.

If the optional output\_field is not supplied, then the result is the result of the operation on rolled\_field. If output\_field is supplied, then the result is the output\_field of the row within the group.

**Nota:** See “GROUPBY macro” a pagina 72 for more information on valid values for keyword.

### Examples

GROUPBY_WHERE (Household_ID, SumOf, Account_Balance, Account_Balance>0)
Computes the sum of all accounts with positive balances for each household.

```
GROUPBY_WHERE (Cust_ID, AvgOf, Purchase_Amt,Date(Current_Date) -  
Date(Purchase_Date)<90)
```

Computes the average purchase amount for each customer for purchases in the last 90 days.

---

## GT macro

The GT macro is available in IBM Campaign and IBM Interact.

### Syntax

```
data1 GT data2 data1 > data2
```

### Parameters

data1

The numerical cell range to compare. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

data2

The numbers to compare all values in the specified column against. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. The number of columns in data2 must equal the number of columns in data1, unless data2 is a constant. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

GT compares the two specified data ranges, returning a one if the values in the first data set are greater than the values in the second data set or a zero otherwise. It returns a new column for each input column, each containing the corresponding column in data1 compared to the corresponding column of data2 (that is, the first column of data1 is compared to the first column of data, the second column with the second column, and so on).

If data2 is a constant, each value in data is compared to that value. If data2 is a column, the calculations are performed on a row-by-row basis. The values in data1 are compared to the first row value of data2, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

**Nota:** The GT operator can be abbreviated with a greater than sign (>).

### Examples

```
TEMP = 3 GT 4 or TEMP = 3 > 4
```

Creates a new column named TEMP containing the value zero (since three is not greater than four).



TEMP = V1 > 8
Creates a new column named TEMP, where each value is one if the corresponding row value of the column V1 is greater than the number eight, otherwise zero.
TEMP = V1:V3 > 2
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the contents of column V1 compared to the value two, the values of the VX column are the contents of column V2 compared to the value two, and the values of the VY column are the contents of column V3 compared to the value two.
TEMP = V1 > V1
Creates a new column named TEMP containing all zeros (since no number is greater than itself).
TEMP = V1 > V2
Creates a new column named TEMP, where each value is the row value of column V1 compared to the corresponding row value of column V2.
TEMP = V1:V3 > V4:V6
Creates three new columns named TEMP, VX, and VY. The column TEMP contains the values in V1 compared to the corresponding row values of column V4. The column VX compares columns V2 and V5. The column VY compares columns V3 and V6.
TEMP = V1[10:20] > V2 or TEMP = V1[10:20] > V2[1:11]
Creates a new column named TEMP, where the first 11 cells contain the results of comparing the values in rows 10-20 of column V1 to the values in rows 1-11 of column V2. The other cells in TEMP are empty.

## Related functions

Function	Description
EQ	Returns TRUE if one data range is equal to another
GE	Returns TRUE if one data range is greater than or equal to another
LE	Returns TRUE if one data range is less than or equal to another
LT	Returns TRUE if one data range is less than another
NE	Returns TRUE if one data range is not equal to another

---

## IF macro

The IF macro is available in IBM Campaign and IBM Interact.

### Syntax

IF(predicate\_col, then\_value) IF(predicate\_col, then\_value, else\_value)

### Parameters

predicate\_col

A column of boolean values or an expression evaluating to a single column of boolean values. Boolean values are interpreted as zero or non-zero. This column should contain at least as many rows as the data range from which data is being extracted.

then\_value

The value(s) to return if the corresponding row of predicate\_col contains a non-zero value. This can be a constant value, a column, or an expression evaluating to any of the above. See "Macro function parameters for IBM Campaign" a pagina 8 for the format definition of then\_value (same as data).

else\_value

If this optional parameter is provided, it is returned if the corresponding row of predicate\_col contains a zero. This can be a constant value, a column, or an expression evaluating to any of the above. If else\_value is not provided, a zero is returned whenever predicate\_col evaluates to false. See "Macro function parameters for IBM Campaign" a pagina 8 for the format definition of else\_value (same as data).

## Description

IF evaluates the expression in predicate\_col and returns then\_value if the expression is true, or else\_value if the expression is false. It returns the same number of columns in then\_value and else\_value. The new column(s) will contain the corresponding row value(s) from then\_value if the value of predicate\_col is non-zero. If else\_value is provided, it is returned when the value of predicate\_col is zero. If else\_value is not provided, zero is returned.

Since IF operates on a row-by-row basis, it produces a result for each row up to the last value of the shortest column (that is, the shortest column out of predicate\_col, then\_value, and else\_value).

**Nota:** Generally, you will want to create a predicate column using one of the comparison macro functions (for example, ==, >, <, ISEVEN, ISODD, and so on).

## Examples

TEMP = IF(1, V1)	Creates a new column named TEMP containing a copy of column V1.
TEMP = IF(V1, 1, 0)	Creates a new column named TEMP, where each value is one if the corresponding value of column V1 is non-zero, otherwise zero.
TEMP = IF(V3, V1, V2)	Creates a new column named TEMP, where each value is copied from column V1 if the corresponding value of column V3 is non-zero; otherwise the value is copied from column V2.
TEMP = IF(ABS(V1-AVG(V1)) < STDV(V1), V1)	Creates a new column named TEMP containing each value in column V1 that is less than one standard deviation away from the mean.

```
TEMP = IF(V3[20:30], V1[30:40], V2)
```

Creates a new column named TEMP containing values for rows 10-20. Each value is copied from column V1 (cells 10-20) if the corresponding value of column V3 (cells 30-40) is non-zero; otherwise the value is copied from column V2 (cells 1-11).

---

## IN macro

The IN macro is available in IBM Campaign and IBM Interact.

### Syntax

valuet IN (value1 AND value2 . . . .) or valuet IN subquery

### Parameters

The first form permits using a list of values instead of a subquery.

The second form uses a subquery that is evaluated to produce an intermediate result, against which further processing can be performed.

### Description

The IN predicate lets you use a list of values instead of a subquery, or will introduce a subquery.

**Nota:** The IN predicate has a negative version, NOT IN. The format for this is identical to IN. NOT IN is true only if the provided value is not found in the values returned by the subquery.

**Important:** When using IN in IBM Interact, you can only use the value IN (value1 AND value2 . . . .) syntax.

### Examples

```
TEMP = IN(25, COLUMN(1...10))
```

Returns the specified column(s) from a data range

```
TEMP = IN("cat", COLUMN("cat", "dog", "bird"))
```

Creates a new column named TEMP containing the value one.

```
TEMP = IN(V1, V1)
```

Creates a new column named TEMP containing all ones.

```
TEMP = IN(V1, V2)
```

Creates a new column named TEMP, where each value is a one if the corresponding row of column V1 contains a value in column V2, else a zero.

---

## INT macro

The INT macro is available only in IBM Campaign.

## Syntax

INT(data)

## Parameters

data

The numerical values to round down to an integer value. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

INT calculates the greatest integer less than the values (also known as the floor) in the specified data range. INT returns one new column for each input column, each containing the floor of numbers in the corresponding input column.

**Nota:** This is the same as the FLOOR macro function.

## Examples

TEMP = INT(4.7)
Creates a new column named TEMP containing the value 4.
TEMP = INT(-1.5)
Creates a new column named TEMP containing the value -2.
TEMP = INT(V1)
Creates a new column named TEMP, where each value is the largest integer less than or equal to the contents of column V1.
TEMP = V1 - INT(V1)
Creates a new column named TEMP containing the decimal portion of each value in column V1.
TEMP = INT(V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the largest integers less than or equal to the contents of column V1, the values of the VX column are the largest integers less than or equal to the contents of column V2, and the values of the VY column are the largest integers less than or equal to the contents of column V3.
TEMP = INT(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the largest integers less than or equal to the corresponding values in rows 10-20 of column V1. The other cells in TEMP are empty.
TEMP = INT(V1[1:5]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the largest integers less than or equal to the corresponding row values of column V1, and the values in column VX are the largest integers less than or equal to the corresponding row values of column V2.

## Related functions

Function	Description
ROUND	Computes the rounded value of the contents of the specified data range
TRUNCATE	Returns the non-fractional part of each value in the specified data range

---

## INVERSE macro

The INVERSE macro is available only in IBM Campaign.

### Syntax

INVERSE(data)

### Parameters

data

The numerical values to compute the inverse of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

INVERSE calculates the negative of the values in the specified data range. It returns  $-x$  (that is, negative values are returned as positive values, and positive values are returned as negative values). INVERSE returns one new column for each input column, each containing the inverse of the values in the corresponding input column.

**Nota:** To invert a value or a column, precede it with a minus sign (-). For example,  $V2 = -V1$  is the same as  $V2 = \text{INVERSE}(V1)$ .

### Examples

TEMP = INVERSE(3.2)
Creates a new column named TEMP containing the value -3.2.
TEMP = INVERSE(V1)
Creates a new column named TEMP, where each value is the negative of the values in column V1.
TEMP = INVERSE(V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the negatives of values in column V1, the values of the VX column are the negatives of the values in column V2, and the values of the VY column are the negatives of the values in column V3.
TEMP = INVERSE(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the negatives of the values of the values in rows 10-20 of column V1. The other cells in TEMP are empty.

TEMP = INVERSE(V1[1:5]:V2)

Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the negatives of the values of the corresponding rows of column V1, and the values in column VX are the negatives of the values of the corresponding rows of column V2.

## Related functions

Function	Description
ABS	Computes the absolute value of the contents of the specified data range
NOT	Computes the logical NOT of the contents of the specified data range
SIGN	Computes the sign (positive or negative) of the values in the specified data range

---

## IS macro

The IS macro is available in IBM Campaign and IBM Interact.

### Syntax

IS <keyword>

### Parameters

keyword

Search condition, typically "NULL," "TRUE," "UNKNOWN," and "FALSE."

### Description

IS is used in complex search conditions. The more complex the search, the more useful the IS condition can be. These Boolean search conditions provide an alternative way of expressing the basic search conditions.

IS returns different results in IBM Interact from IBM Campaign. NULL returns 1 if there is at least one NULL value for an audience id. UNKNOWN returns 1 for an audience id if it doesn't have any value.

---

## ISERROR macro

The ISERROR macro is available only in IBM Campaign.

### Syntax

ISERROR(data)

### Parameters

data

The values to test if any of the rows contain an error (that is, a ??? cell). This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

ISERROR checks if any cell of each row of the specified data range contains an error (that is, a ??? cell). It returns one new column, each row containing a one if the corresponding row of data contains an error. Otherwise, it contains a zero. This row-by-row calculation produces a result for each row up to the last value of the longest column.

## Examples

TEMP = ISERROR(-3)
Creates a new column named TEMP containing the value zero.
TEMP = ISERROR(V1)
Creates one new columns named TEMP, where each value is a one if the corresponding row of column V1 contains ???, otherwise, a zero.
TEMP = ISERROR(V1:V3)
Creates one new columns named TEMP, where each value is a one if any of the cells in the corresponding rows of column V1 - V3 contains ???, otherwise, a zero.
TEMP = ISERROR(V1[50:100]:V10)
Creates one new columns named TEMP, with values in rows 1-50. Each value is a one if any of the cells in rows 50-100 of columns V1 - V10 contains ???, otherwise, a zero.

---

## ISODD macro

The ISODD macro is available only in IBM Campaign.

### Syntax

ISODD(data)

### Parameters

data

The numerical values to test if they are odd. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

ISODD tests each value in the specified data set for oddness. It returns one new column for each input column, each containing a one for all odd values (that is, the value modulo two is one) or a zero for all non-odd values (that is, even values).

**Nota:** For non-integer values, the macro function INT is applied first. For example, ISODD(2.5) = 0, since 2 is not odd.

## Examples

TEMP = ISODD(-3)
Creates a new column named TEMP containing the value one.
TEMP = ISODD(V1)
Creates a new column named TEMP, where each value is the result of testing the contents of column V1 for oddness.
TEMP = ISODD(V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the results of testing the contents of column V1 for oddness, the values of the VX column are the results of testing the contents of column V2 for oddness, and the values of the VY column are the results of testing the contents of column V3 for oddness.
TEMP = ISODD(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the results of testing the values in rows 10-20 of column V1 for oddness. The other cells in TEMP are empty.
TEMP = ISODD(V1[1:5]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the results of testing the corresponding rows of column V1 for oddness, and the values in column VX are the results of testing the corresponding rows of column V2 for oddness.

## Related functions

Function	Description
ISEVEN	Tests if input values are even (that is, divisible by two)

---

## ISEVEN macro

The ISEVEN macro is available only in IBM Campaign.

### Syntax

ISEVEN(data)

### Parameters

data

The numerical values to test if they are even. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.



## Description

ISEVEN tests each value in the specified data set for evenness. It returns one new column for each input column, each containing a one for all even values (that is, the value modulo two is zero) or a zero for all non-even values (that is, odd values).

**Nota:** For non-integer values, the macro function INT is applied first. For example, ISEVEN(2.5) = 1, since 2 is even.

## Examples

TEMP = ISEVEN(-3)
Creates a new column named TEMP containing the value zero.
TEMP = ISEVEN(V1)
Creates a new column named TEMP, where each value is the result of testing the contents of column V1 for evenness.
TEMP = ISEVEN(V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the results of testing the contents of column V1 for evenness, the values of the VX column are the results of testing the contents of column V2 for evenness, and the values of the VY column are the results of testing the contents of column V3 for evenness.
TEMP = ISEVEN(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the results of testing the values in rows 10-20 of column V1 for evenness. The other cells in TEMP are empty.
TEMP = ISEVEN(V1[1:5]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the results of testing the corresponding rows of column V1 for evenness, and the values in column VX are the results of testing the corresponding rows of column V2 for evenness.

## Related functions

Function	Description
ISODD	Tests if input values are odd (that is, not divisible by two)

---

## ISODD macro

The ISODD macro is available only in IBM Campaign.

### Syntax

ISODD(data)

### Parameters

data

The numerical values to test if they are odd. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

ISODD tests each value in the specified data set for oddness. It returns one new column for each input column, each containing a one for all odd values (that is, the value modulo two is one) or a zero for all non-odd values (that is, even values).

**Nota:** For non-integer values, the macro function INT is applied first. For example, ISODD(2.5) = 0, since 2 is not odd.

## Examples

TEMP = ISODD(-3)
Creates a new column named TEMP containing the value one.
TEMP = ISODD(V1)
Creates a new column named TEMP, where each value is the result of testing the contents of column V1 for oddness.
TEMP = ISODD(V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the results of testing the contents of column V1 for oddness, the values of the VX column are the results of testing the contents of column V2 for oddness, and the values of the VY column are the results of testing the contents of column V3 for oddness.
TEMP = ISODD(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the results of testing the values in rows 10-20 of column V1 for oddness. The other cells in TEMP are empty.
TEMP = ISODD(V1[1:5]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the results of testing the corresponding rows of column V1 for oddness, and the values in column VX are the results of testing the corresponding rows of column V2 for oddness.

## Related functions

Function	Description
ISEVEN	Tests if input values are even (that is, divisible by two)

---

## LE macro

The LE macro is available in IBM Campaign and IBM Interact.

### Syntax

data1 LE data2 data1 <= data2

## Parameters

data1

The numerical cell range to compare. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

data2

The number(s) to compare all values in the specified column against. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

LE compares the two specified data ranges, returning a one if the values in the first data set are less than or equal to the values in the second data set or a zero otherwise. It returns a new column for each input column, each containing the corresponding column in data1 compared to the corresponding column of data2 (that is, the first column of data1 is compared to the first column of data, the second column with the second column, and so on).

If data2 is a constant, each value in data is compared to that value. If data2 is a column, the calculations are performed on a row-by-row basis. The values in data1 are compared to the first row value of data2, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

**Nota:** The LE operator can be abbreviated with a less than sign followed by an equal sign (<=).

## Examples

```
TEMP = 4 LE 4 or TEMP = 4 <= 4
```

Creates a new column named TEMP containing the value one (since four is equal to itself).

```
TEMP = V1 <= 8
```

Creates a new column named TEMP, where each value is one if the corresponding row value of the column V1 is less than or equal to the number eight, otherwise zero.

```
TEMP = V1:V3 <= 2
```

Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the contents of column V1 compared to the value two, the values of the VX column are the contents of column V2 compared to the value two, and the values of the VY column are the contents of column V3 compared to the value two.

```
TEMP = V1 <= V1
```

Creates a new column named TEMP containing all ones (since every number is equal to itself).

```
TEMP = V1 <= V2
```

Creates a new column named TEMP, where each value is the row value of column V1 compared to the corresponding row value of column V2.

TEMP = V1[10:20] <= V2 or TEMP = V1[10:20] <= V2[1:11]

Creates a new column named TEMP, where the first 11 cells contain the results of comparing the values in rows 10-20 of column V1 with the values in rows 1-11 of column V2. The other cells in TEMP are empty.

## Related functions

Function	Description
EQ	Returns TRUE if one data range is equal to another
GE	Returns TRUE if one data range is greater than or equal to another
GT	Returns TRUE if one data range is greater than another
LT	Returns TRUE if one data range is less than another
NE	Returns TRUE if one data range is not equal to another

---

## LIKE macro

The LIKE macro is available in IBM Campaign and IBM Interact.

### Syntax

data1 [NOT] LIKE data2

### Parameters

data1

The cell range to compare. This can be a text string or an expression evaluating to a text string. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

data2

The text pattern to compare all values in the specified column against. This can be a text string or an expression evaluating to a text string. The number of columns in data2 must equal the number of columns in data1, unless data2 is a constant. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

An underscore ( ) in data2 represents a wildcard character that will match any single character in data1. A percent sign (%) will match zero or more characters in data1.

### Description

LIKE compares the two specified data ranges, returning a one if the strings match or a zero if they do not. It returns a new column for each input column, each containing the corresponding column in data1 compared to the corresponding

column of data2 (that is, the first column of data1 is compared to the first column of data2, the second column with the second column, and so on).

If data2 is a string constant, each string in data1 is compared to that string. If data2 is a column, the calculations are performed on a row-by-row basis. The first row string in data1 is compared to the first row string of data2, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last string in the shortest column.

When comparing strings, case does not matter (that is, "Yes", "YES", "yes", and "yeS" are all considered equal).

**Nota:** The LIKE macro has a negative version, NOT LIKE. The format for this is identical to LIKE. NOT LIKE returns a one if the string in data1 does not match the template defined by data2.

## Examples

TEMP = "gold" LIKE "gold"
Creates a new column named TEMP containing the value one (since the two strings match).
TEMP = "No" LIKE "NO"
Creates a new column named TEMP containing the value one (string compares are case insensitive).
TEMP = V1 LIKE "gold%"
Creates a new column named TEMP, where each value is one if the corresponding row value of the column V1 is equal to the string "gold" followed by any number of characters. Otherwise, each value is zero.
TEMP = V1 LIKE "g_ld"
Creates a new column named TEMP, where each value is one if the corresponding row value of the column V1 is equal to the string "g" followed by any character, followed by "ld". Otherwise, each value is zero.
TEMP = V1 LIKE V1
Creates a new column named TEMP containing all ones (since every number is equal to itself).
TEMP = V1 LIKE V2
Creates a new column named TEMP, where each value is the row value of column V1 compared to the corresponding row value of column V2.
TEMP = V1:V3 LIKE V4:V6
Creates three new columns named TEMP, VX, and VY. The column TEMP contains the strings in V1 compared to the corresponding row strings of column V4. The column VX compares columns V2 and V5. The column VY compares columns V3 and V6.
TEMP = V1[10:20] LIKE V2 or TEMP = V1[10:20] LIKE V2[1:11]
Creates a new column named TEMP, where the first 11 cells contain the results of comparing the strings in rows 10-20 of column V1 to rows 1-11 of column V2. The other cells in TEMP are empty.

## Related functions

Function	Description
EQ	Returns TRUE if one data range is equal to another
GE	Returns TRUE if one data range is greater than or equal to another
GT	Returns TRUE if one data range is greater than another
LE	Returns TRUE if one data range is less than or equal to another
LT	Returns TRUE if one data range is less than another
NE	Returns TRUE if one data range is not equal to another

---

## LN or LOG macro

The LN or LOG macro is available only in IBM Campaign.

### Syntax

LN(data) or LOG(data)

### Parameters

data

The numerical values to compute the natural logarithm of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

LN or LOG calculates the natural log of each value in the specified data range. It returns one new column for each input column, each containing the natural logarithm of numbers in the corresponding input column. Natural logarithms are based on the constant  $e = 2.7182818$ . LN is the inverse of the EXP macro function.

**Nota:** All values in the specified data range must be greater than zero. Otherwise, a blank cell is returned for each invalid input.

### Examples

TEMP = LN(3) or TEMP = LOG(3) Creates a new column named TEMP containing the value 1.099.
TEMP = LN(V1) Creates a new column named TEMP, where each value is the natural log of the contents of column V1.

TEMP = LN(V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the natural logs of the contents of column V1, the values in the VX column are the natural logs of the contents of column V2, and the values in the VY column are the natural logs of the contents of column V3.
TEMP = LN(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the natural logs of the values in rows 10-20 of column V1. The other cells in TEMP are empty.
TEMP = LN(V1[1:5]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the natural logs of the corresponding rows of column V1, and the values in column VX are the natural logs of the corresponding rows of column V2.

## Related functions

Function	Description
EXP	Computes the natural number (e) raised to the contents of each cell in the specified data range
LOG2	Computes the log base2 of the contents of the specified data range
LOG10	Computes the log base10 of the contents of the specified data range
POW	Computes a base value raised to the specified exponential power(s)

---

## LOG2 macro

The LOG2 macro is available only in IBM Campaign.

### Syntax

LOG2(data)

### Parameters

data

The numerical values to compute the base2 logarithm of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

LOG2 calculates the base-2 logarithm of values in the specified data range. It returns one new column for each input column, each containing the base2 logarithm of numbers in the corresponding input column.

**Nota:** All values in the specified data range must be greater than zero. Otherwise, a blank cell is returned for each invalid input.

## Examples

TEMP = LOG2(8)
Creates a new column named TEMP containing the value three.
TEMP = LOG2(V1)
Creates a new column named TEMP, where each value is the base2 log of the contents of column V1.
TEMP = LOG2(V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the base2 logs of the contents of column V1, the values of the VX column are the base2 logs of the contents of column V2, and the values of the VY column are the base2 logs of the contents of column V3.
TEMP = LOG2(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the base-2 logs of the values in rows 10-20 of column V1. The other cells in TEMP are empty.
TEMP = LOG2(V1[1:5]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the base-2 logs of the corresponding rows of column V1, and the values in column VX are the base-2 logs of the corresponding rows of column V2.

## Related functions

Function	Description
LN or LOG	Computes the natural log of the contents of the specified data range
LOG10	Computes the log base10 of the contents of the specified data range
POW	Exponential power

---

## LOG10 macro

The LOG10 macro is available only in IBM Campaign.

### Syntax

LOG10(data)

### Parameters

data

The numerical values to compute the base10 logarithm of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.



## Description

LOG10 calculates the base-10 logarithm of the values in the specified data range. It returns one new column for each input column, each containing the base10 logarithm of numbers in the corresponding input column.

**Nota:** All values in the specified data range must be greater than zero. Otherwise, a blank cell is returned for each invalid input.

## Examples

TEMP = LOG10(100)
Creates a new column named TEMP containing the value two.
TEMP = LOG10(V1)
Creates a new column named TEMP, where each value is the base10 log of the contents of column V1.
TEMP = LOG10(V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the base10 logs of the contents of column V1, the values of the VX column are the base10 logs of the contents of the column V2, and the values of the VY column are the base10 logs of the contents of column V3.
TEMP = LOG10(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the base-10 logs of the values in rows 10-20 of column V1. The other cells in TEMP are empty.
TEMP = LOG10(V1[1:5]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the base-10 logs of the corresponding rows of column V1, and the values in column VX are the base-10 logs of the corresponding rows of column V2.

## Related functions

Function	Description
LN or LOG	Computes the natural log of the contents of the specified data range
LOG2	Computes the log base2 of the contents of the specified data range
POW	Exponential power

---

## LOWER macro

The LOWER macro is available in IBM Campaign and IBM Interact.

### Syntax

LOWER(data)

## Parameters

data

The string value to be converted to lowercase.

## Description

LOWER converts each string value in the specified data range to lowercase. It returns a new column with each cell containing the lowercased string of the corresponding input cell.

## Examples

Temp = LOWER "GOLD"
Creates a new column named Temp containing "gold".
TEMP = LOWER( "JAN 15, 1997")
Creates a new column named TEMP, which contains the ASCII text string " jan 15, 1997 ".
TEMP = LOWER( "Pressure")
Creates a new column named TEMP, which contains the ASCII text string "pressure".
TEMP = LOWER(V1)
Creates a new column named TEMP containing lowercase characters of each string in column V1.

---

## LT macro

The LT macro is available in IBM Campaign and IBM Interact.

## Syntax

```
data1 LT data2 data1 < data2
```

## Parameters

data1

The numerical cell range to compare. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

data2

The number(s) to compare all values in the specified column against. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

LT compares the two specified data ranges, returning a one if the values in the first data set are less than the values in the second data set or a zero otherwise. It

returns a new column for each input column, each containing the corresponding column in data1 compared to the corresponding column of data2 (that is, the first column of data1 is compared to the first column of data, the second column with the second column, and so on).

If data2 is a constant, each value in data is compared to that value. If data2 is a column, the calculations are performed on a row-by-row basis. The values in data1 are compared to the first row value of data2, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

**Nota:** The LT operator can be abbreviated with a less than sign (<).

## Examples

TEMP = 3 LT 4 or TEMP = 3 < 4
Creates a new column named TEMP containing the value one (since three is less than four).
TEMP = V1 < 8
Creates a new column named TEMP, where each value is one if the corresponding row value of the column V1 is less than the number eight, otherwise zero.
TEMP = V1:V3 < 2
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the contents of column V1 compared to the value two, the values of the VX column are the contents of column V2 compared to the value two, and the values of the VY column are the contents of column V3 compared to the value two.
TEMP = V1 < V1
Creates a new column named TEMP containing all zeros (since no number is less than itself).
TEMP = V1 < V2
Creates a new column named TEMP, where each value is the row value of column V1 compared to the corresponding row value of column V2.
TEMP = V1[10:20] < V2 or TEMP = V1[10:20] < V2[1:11]
Creates a new column named TEMP, where the first 11 cells contain the results of comparing the values in rows 10-20 of column V1 to rows 1-11 of column V2. The other cells in TEMP are empty.

## Related functions

Function	Description
EQ	Returns TRUE if one data range is equal to another
GE	Returns TRUE if one data range is greater than or equal to another
GT	Returns TRUE if one data range is greater than another
LE	Returns TRUE if one data range is less than or equal to another

---

## LTRIM macro

The LTRIM macro is available in IBM Campaign and IBM Interact.

### Syntax

LTRIM(data)

### Parameters

data

The string from which the leading space will be removed.

### Description

LTRIM removes leading space characters from each string value in the specified data range, returning the converted string. It returns one new column for each input column.

### Examples

```
Temp = LTRIM " gold"
```

Creates a new string named Temp which contains "gold".

---

## MAX macro

The MAX macro is available in IBM Campaign and IBM Interact.

### Syntax

MAX(data [, keyword])

### Parameters

data

The numerical values to compute the maximum of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

keyword

This optional keyword determines how the computation is performed over the input data range. Select one of the following:

ALL - Performs the computation on all cells in data (default)

COL - Performs the computation separately for each column of data

ROW - Performs the computation separately for each row of data

For more details on using keywords in IBM Campaign, see “Format Specifications” a pagina 8.

**Nota:** Many macro functions take the keyword parameters {ALL | COL | ROW}. These keywords do not apply in IBM Campaign because the input data is always a single column or field. The macro will always behave as if the COL keyword were specified. Therefore, you do not need to specify these keywords when using IBM Campaign.

## Description

MAX calculates the maximum of the values in the specified data range. It returns a single new column containing the maximum value.

## Examples

TEMP = MAX(3) or TEMP = MAX(3, ALL)
Creates a new column named TEMP containing the value three.
TEMP = MAX(V1)
Creates a new column named TEMP containing a single value which is the maximum value of the contents of column V1.
TEMP = MAX(V1:V3)
Creates a new column named TEMP containing a single value which is the maximum of the columns V1, V2, and V3.
TEMP = MAX(V1[10:20])
Creates a new column named TEMP containing a single value which is the maximum of the cells in rows 10-20 of column V1.
TEMP = MAX(V1[1:5]:V4)
Creates a new column named TEMP containing a single value which is the maximum of the cells in rows 1-5 of columns V1 through V4.
TEMP = MAX(V1:V3, COL)
Creates three new columns named TEMP, VX, and VY. The single value in the TEMP column is the maximum of the contents of column V1, the single value in the VX column is the maximum of the contents of column V2, and the single value in the VY column is the maximum of the contents of column V3.
TEMP = MAX(V1[1:5]:V3, COL)
Creates three new columns named TEMP, VX, and VY, each containing a single value. The value in column TEMP is the maximum of the cells in rows 1-5 of column V1, the value in column VX is the maximum of the cells in rows 1-5 of column V2, and the value in column VY is the maximum of the cells in rows 1-5 of column V3.
TEMP = MAX(V1:V3, ROW)
Creates a new column named TEMP where each cell entry is the maximum of the corresponding row across columns V1, V2, and V3.
TEMP = MAX(V1[10:20]:V3, ROW)
Creates a new column named TEMP, where the first 11 cells contain the maximum of the values in rows 10-20 across columns V1 through V3. The other cells in TEMP are empty.

## Related functions

Function	Description
MIN	Computes the minimum of a range of cells

---

## MEAN macro

The MEAN macro is available in IBM Campaign and IBM Interact.

### Syntax

MEAN(data [, keyword])

### Parameters

data

The numerical values to compute the arithmetic mean of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

keyword

This optional keyword determines how the computation is performed over the input data range. Select one of the following:

ALL - Performs the computation on all cells in data (default)

COL - Performs the computation separately for each column of data

ROW - Performs the computation separately for each row of data

See "DATE" a pagina 50 for more details on using keywords.

**Nota:** Many macro functions take the keyword parameters {ALL | COL | ROW}. These keywords do not apply in IBM Campaign because the input data is always a single column or field. The macro will always behave as if the COL keyword were specified. Therefore, you do not need to specify these keywords when using IBM Campaign .

### Description

MEAN calculates the arithmetic mean or average of the cells in the specified data range. The arithmetic mean is calculated by summing the contents of all cells divided by the number of cells. The number of columns returned by MEAN depends on keyword.

- If keyword is ALL, MEAN returns one new column, containing a single value (the average of all cells in data).
- If keyword is COL, MEAN returns a new column for each input column. Each new column contains one value (the average of all cells in the corresponding input column).
- If keyword is ROW, MEAN returns one new column containing the average across each row of data.

**Nota:** Blank cells are ignored in the mean.

**Nota:** MEAN is the same as the AVG macro function.

## Examples

TEMP = MEAN(V1)
Creates a new column named TEMP containing a single value which is the arithmetic mean of the contents of column V1.
TEMP = MEAN(V1:V3)
Creates a new column named TEMP containing a single value which is the arithmetic mean of the contents of columns V1, V2, and V3.
TEMP = MEAN(V1[10:20])
Creates a new column named TEMP containing a single value which is the arithmetic mean of the cells in rows 10-20 of column V1.
TEMP = MEAN(V1[1:5]:V4)
Creates a new column named TEMP containing a single value which is the arithmetic mean of the cells in rows 1-5 of columns V1 through V4.
TEMP = MEAN(V1:V3, COL)
Creates three new columns named TEMP, VX, and VY. The single value in the TEMP column is the arithmetic mean of the contents of column V1, the single value in the VX column is the arithmetic mean of the contents of column V2, and the single value in the VY column is the arithmetic mean of the contents of column V3.
TEMP = MEAN(V1[10:20]:V3, COL)
Creates three new columns named TEMP, VX, and VY, each containing a single value. The value in column TEMP is the arithmetic mean of the cells in rows 10-20 of column V1, the value in column VX is the arithmetic mean of the cells in rows 10-20 of column V2, and the value in column VY is the arithmetic mean of the cells in rows 10-20 of column V3.
TEMP = MEAN(V1:V3, ROW)
Creates a new column named TEMP where each cell entry is the arithmetic mean of the corresponding row across columns V1, V2, and V3.
TEMP = MEAN(V1[1:5]:V3, ROW)
Creates a new column named TEMP, where the cells in rows 1-5 contain the arithmetic mean of the corresponding row across columns V1 through V3. The other cells in TEMP are empty.

## Related functions

Function	Description
SUM or TOTAL	Computes the sum of a range of cells

---

## MIN macro

The MIN macro is available in IBM Campaign and IBM Interact.

### Syntax

MIN(data [, keyword])

## Parameters

data

The numerical values to compute the minimum of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

keyword

This optional keyword determines how the computation is performed over the input data range. Select one of the following:

ALL - Performs the computation on all cells in data (default)

COL - Performs the computation separately for each column of data

ROW - Performs the computation separately for each row of data

See "DATE" a pagina 50 for more details on using keywords.

**Nota:** Many macro functions take the keyword parameters {ALL | COL | ROW}. These keywords do not apply in **IBM Campaign** because the input data is always a single column or field. The macro will always behave as if the COL keyword were specified. Therefore, you do not need to specify these keywords when using **IBM Campaign** .

## Description

MIN calculates the minimum of all the cells in the specified data range. It returns a single column containing the minimum value.

## Examples

TEMP = MIN(V1)
Creates a new column named TEMP containing a single value which is the minimum value of column V1.
TEMP = MIN(V1:V3)
Creates a new column named TEMP containing a single value which is the minimum of columns V1, V2, and V3.
TEMP = MIN(V1[10:20])
Creates a new column named TEMP containing a single value which is the minimum of the cells in rows 10-20 of column V1.
TEMP = MIN(V1[1:5]:V4)
Creates a new column named TEMP containing a single value which is the minimum of the cells in rows 1-5 of columns V1 through V4.
TEMP = MIN(V1:V3, COL)
Creates three new columns named TEMP, VX, and VY. The single value in the TEMP column is the minimum of column V1, the single value in the VX column is the minimum of column V2, and the single value in the VY column is the minimum of column V3.



TEMP = MIN(V1[1:5]:V3, COL)
Creates three new columns named TEMP, VX, and VY, each containing a single value. The value in column TEMP is the minimum of the cells in rows 1-5 of column V1, the value in column VX is the minimum of the cells in rows 1-5 of column V2, and the value in column VY is the minimum of the cells in rows 1-5 of column V3.
TEMP = MIN(V1:V3, ROW)
Creates a new columns named TEMP where each cell entry is the minimum of the corresponding row across columns V1, V2, and V3.
TEMP = MIN(V1[10:20]:V3, ROW)
Creates a new column named TEMP, where the first 11 cells contain the minimum of the values in rows 1-5 across columns V1 through V3. The other cells in TEMP are empty.

## Related Functions

Function	Description
MAX	Computes the maximum of a range of cells
MAX_TO_INDEX	Returns the column index of the maximum value for each row of the specified column

---

## MINUS macro

The MINUS macro is available in IBM Campaign and IBM Interact.

### Syntax

data MINUS subtrahend data - subtrahend

### Parameters

data

The cell range containing numbers to subtract from. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

subtrahend

The number(s) to subtract from all values in the specified column. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. The number of columns in subtrahend must equal the number of columns in data, unless subtrahend is a constant. For the format definition of subtrahend (same as data), see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

MINUS subtracts subtrahend from the specified data range data. It returns a new column for each input column, each containing the corresponding column in data

minus the corresponding column of subtrahend (that is, the first column of data subtracts the first column of subtrahend, the second column with the second column, and so on).

If subtrahend is a constant, each value in data is subtracts that value. If subtrahend contains one or more columns, the calculations are performed on a row-by-row basis between one column from data and one column from subtrahend. The first row of data subtracts the first row value of subtrahend, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

**Nota:** The MINUS operator can be abbreviated with a minus sign or hyphen (-).

## Examples

TEMP = 7 MINUS 4 or TEMP = 7 - 4
Creates a new column named TEMP containing the value three.
TEMP = V1 - 8
Creates a new column named TEMP, where each value is the contents of column V1 minus eight.
TEMP = V1:V3 - 2
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the contents of column V1 minus two, the values of the VX column are the contents of column V2 minus two, and the values of the VY column are the contents of column V3 minus two.
TEMP = V1 - V1
Creates a new column named TEMP containing all zeros (since any number minus itself is zero).
TEMP = V1 - V2
Creates a new column named TEMP, where each value is the row value of column V1 minus the corresponding row value of column V2.
TEMP = V1:V3 -V4:V6
Creates three new columns named TEMP, VX, and VY. The column TEMP contains the values in V1 minus the corresponding row values of column V4. The column VX subtracts column V5 from V2. The column VY subtracts column V6 from V3.
TEMP = V1[10:20] - V2 or TEMP = V1[10:20] - V2[1:11]
Creates a new column named TEMP, where the first 11 cells contain the values in rows 10-20 of column V1 minus the values in rows 1-11 of column V2. The other cells in TEMP are empty.

## Related functions

Function	Description
PLUS	Adds the contents of two data ranges
SUM or TOTAL	Computes the sum of a range of cells

---

## MOD macro

The MOD macro is available in IBM Campaign and IBM Interact.

## Syntax

data MOD divisor data % divisor

## Parameters

data

The integer values to compute the modulo of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

divisor

The non-zero base integer to compute the modulo in respect to. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. The number of columns in divisor must equal the number of columns in data, unless divisor is a constant. For the format definition of divisor (same as data), see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

MOD calculates the remainder of dividing the specified data range by a specified value. This is computed by dividing divisor into each value and returning the remainder. It returns one new column for each input column, each containing the numbers in data modulo divisor. The remainder will have the same sign (positive or negative) as data.

If divisor is a constant, each value in the specified column is calculated modulo that value. If divisor is a column, the calculations are performed on a row-by-row basis. The values in data are calculated modulo the first row value of divisor, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

**Nota:** If divisor is zero, a divide by zero error is returned.

**Nota:** The MOD operator can be abbreviated with the percent sign (%). For example, TEMP = 5 % 3 is equivalent to TEMP = 5 MOD 3.

## Examples

TEMP = 10 MOD 8 or TEMP = 10 % 8
Creates a new column named TEMP containing the value 2.
TEMP = -10 % 8
Creates a new column named TEMP containing the value -2.
TEMP = V1 % 8
Creates a new column named TEMP, where each value is the contents of column V1, modulo eight.

TEMP = V1:V3 % 2
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the values modulo two of the contents of column V1, the values of the VX column are the values modulo two of the contents of column V2, and the values of the VY column are the values modulo two of the contents of column V3.
TEMP = V1 % V1
Creates a new column named TEMP, containing a zero for each entry in the column V1. This is because every number modulo itself is zero.
TEMP = V1 % V2
Creates a new column named TEMP, where each value is the row value of column V1 modulo the corresponding row value of column V2. Note that if V2=V1, then all zeros are returned, as in the previous example.
TEMP = V1:V3 % V4:V6
Creates three new columns named TEMP, VX, and VY. The column TEMP contains the values in V1 modulo the corresponding row values of column V4. The column VX contains the results of column V2 modulo V5. The column VY contains the results of column V3 modulo V6.
TEMP = V1[10:20] % V2 or TEMP = V1[10:20] % V2[1:11]
Creates a new column named TEMP, where the first 11 cells are the values of the values in rows 10-20 of column V1 modulo the values in rows 1-11 of column V2. The other cells in TEMP are empty.

## Related functions

Function	Description
DIV	Divides one specified data range by another
MOD	Computes the modulo of the contents of the specified data range

---

## MONTHOF macro

The MONTHOF macro is available only in IBM Campaign.

### Syntax

MONTHOF(date\_string [, input\_format])

### Parameters

date\_string

A text representing a valid date.

input\_format

One of the keywords in the table below, specifying the date format of date\_string.

## Description

MONTHOF returns the month as a number for the date specified by the date\_string. If input\_format is not provided, the default keyword DELIM\_M\_D\_Y will be used.

## Examples

MONTHOF("012171",MMDDYY) returns the number 1.

**Nota:** See "DATE" a pagina 50 for additional information on valid date formats.

## Related functions

Function	Description
DAYOF	Returns the day of the week as a number.
WEEKDAYOF	Returns the weekday of the week as a number.
YEAROF	Returns the year as a number.

---

## MULT macro

The MULT macro is available in IBM Campaign and IBM Interact.

### Syntax

```
data MULT multiplier data * multiplier
```

### Parameters

data

The numerical values to multiply. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

multiplier

The number to multiply all values in the specified column by. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. The number of columns in multiplier must equal the number of columns in data, unless multiplier is a constant. For the format definition of multiplier (same as data), see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

MULT multiplies the values in the two specified data ranges. It returns one new column for each input column, each containing the numbers in data multiplied by multiplier. If multiplier is a constant, each value in data is multiplied by that value. If multiplier is a column, the calculations are performed on a row-by-row basis. The values in data are multiplied by the first row value of multiplier, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

**Nota:** Using a column containing the same number  $x$  in each row as multiplier is the same as using the constant  $x$  as multiplier.

**Nota:** The MULT operator can be abbreviated with an asterisk (\*).

## Examples

TEMP = 8 MULT 4 or TEMP = 8 * 4
Creates a new column named TEMP containing the value 32.
TEMP = V1 * 8
Creates a new column named TEMP, where each value is the contents of column V1 multiplied by eight.
TEMP = V1:V3 * 2
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are two times the contents of column V1, the values of the VX column are two times the contents of column V2, and the values of the VY column are two times the contents of column V3.
TEMP = V1 * V1
Creates a new column named TEMP containing the square of each value in column V1.
TEMP = V1 * V2
Creates a new column named TEMP, where each value is the row value of column V1 multiplied by the corresponding row value of column V2.
TEMP = V1:V3 * V4:V6
Creates three new columns named TEMP, VX, and VY. The column TEMP contains the values in V1 times the corresponding row values of column V4. The column VX multiplies column V2 by V5. The column VY multiplies column V3 by V6.
TEMP = V1[10:20] * V2 or TEMP = V1[10:20] * V2[1:11]
Creates a new column named TEMP, where the first 11 cells contain the values in rows 10-20 of column V1 times the values in rows 1-11 of column V2. The other cells in TEMP are empty.

## Related functions

Function	Description
DIV	Divides one specified data range by another
EXP	Computes the natural number (e) raised to the contents of each cell in the specified data range
POW	Computes a base value raised to the specified exponential power(s)

---

## NE macro

The NE macro is available in IBM Campaign and IBM Interact.

### Syntax

data1 NE data2 data1 != data2 data1 <> data2

## Parameters

data1

The cell range to compare. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

data2

The number(s) to compare all values in the specified column against. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. The number of columns in data2 must equal the number of columns in data1, unless data 2 is a constant. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

NE compares the two specified data ranges, returning a one if the values are not equal or a zero if they are equal. It returns a new column for each input column, each containing the corresponding column in data1 compared to the corresponding column of data2 (that is, the first column of data1 is compared to the first column of data, the second column with the second column, and so on).

If data2 is a constant, each value in data1 is compared to that value. If data2 is a column, the calculations are performed on a row-by-row basis. The values in the first row of data1 are compared to the first row value of data2, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

**Nota:** Using a column containing the same number  $x$  in each row as data2 is the same as using the constant  $x$  as data2.

**Nota:** The NE operator can be abbreviated with an exclamation point followed by an equal sign (!=) or by a less-than sign followed by a greater-than sign (<>).

## Examples

```
TEMP = 3 NE 4 or TEMP = 3 != 4 TEMP = 3 <> 4
```

Creates a new column named TEMP containing the value one (since three is not equal to four).

```
TEMP = V1 != 8
```

Creates a new column named TEMP, where each value is one if the corresponding row value of the column V1 is not equal to the number eight, otherwise zero.

```
TEMP = V1:V3 != 2
```

Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the contents of column V1 compared to the value two, the values of the VX column are the contents of column V2 compared to the value two, and the values of the VY column are the contents of column V3 compared to the value two.

```
TEMP = V1 != V1
```

Creates a new column named TEMP containing all zeros (since every number is equal to itself).

TEMP = V1 != V2
Creates a new column named TEMP, where each value is the row value of column V1 compared to the corresponding row value of column V2.
TEMP = V1:V3 != V4:V6
Creates three new columns named TEMP, VX, and VY. The column TEMP contains the values in V1 compared to the corresponding row values of column V4. The column VX compares columns V2 and V5. The column VY compares columns V3 and V6.
TEMP = V1[10:20] != V2 or TEMP = V1[10:20] != V2[1:11]
Creates a new column named TEMP, where the first 11 cells contain the results of comparing the values in rows 10-20 of column V1 and rows 1-11 of column V2. The other cells in TEMP are empty.

## Related functions

Function	Description
EQ	Returns TRUE if one data range is equal to another
GE	Returns TRUE if one data range is greater than or equal to another
GT	Returns TRUE if one data range is greater than another
LE	Returns TRUE if one data range is less than or equal to another
LT	Returns TRUE if one data range is less than another

---

## NOT macro

The NOT macro is available in IBM Campaign and IBM Interact.

### Syntax

NOT(data) ! data

### Parameters

data

The numerical values to compute the logical NOT of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

NOT returns the logical NOT of the values in the specified data range. It returns one new column for each input column, each containing the logical NOT of the values in the corresponding input column. This function returns zero for non-zero values and one for zero values.



**Nota:** The NOT operator can be abbreviated with an exclamation mark (!). Use the exclamation mark before the data value (for example, to specify NOT(V1), you can simply type !V1).

## Examples

TEMP = NOT(3.2) or TEMP = !1
Creates a new column named TEMP containing the value zero.
TEMP = !0 or TEMP = !(2+2=3)
Creates a new column named TEMP containing the value one.
TEMP = !V1
Creates a new column named TEMP, where each value is the logical NOT of the values in column V1.
TEMP = !V1:V3
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the logical NOTs of values in column V1, the values of the VX column are the logical NOTs of the values in column V2, and the values of the VY column are the logical NOTs of the values in column V3.
TEMP = !V1[10:20]
Creates a new column named TEMP, where the first 11 cells contain the logical NOTs of the values in rows 10-20 of column V1. The other cells in TEMP are empty.
TEMP = !V1[1:5]:V2
Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the logical NOTs of the values of the corresponding rows of column V1, and the values in column VX are the logical NOTs of the values of the corresponding rows of column V2.

## Related functions

Function	Description
AND	Computes the logical AND between two specified data ranges
INVERSE	Computes the negative of the contents of the specified data range
OR	Computes the logical OR between two specified data ranges
SIGN	Computes the sign (positive or negative) of the values in the specified data range

---

## NUMBER macro

The NUMBER macro is available in IBM Campaign and IBM Interact.

### Syntax

NUMBER(data [, conversion\_keyword])

## Parameters

data

The ASCII text data to convert to numerical values. This can be ASCII text in quotes, a column of text, a cell range containing text, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

conversion\_keyword

This optional keyword specifies how to interpret text formats for dates and times. Select one of the keywords in the following table.

**Nota:** If this parameter is not specified, the default is 1.

Conversion Keyword	Format	Description
0	#####	Converts the first 5 characters of each text string into a unique number
1	\$ ( default)	Converts dollar values to numerics (for example, "\$123.45" to 123.45)
2	%	Converts a percentage value to numerics (for example, "50%" to 0.5)
3	mm/dd/yy hh:mm	Converts a date and time to the number of days elapsed since January 1, 0000 (1900 is automatically added to the yy year)
4	dd-mmm-yy	Converts a date to the number of days elapsed since January 1, 0000 (1900 is automatically added to the yy year)
5	mm/dd/yy	Converts a date to the number of days elapsed since January 1, 0000 (1900 is automatically added to the yy year)
6	mmm-yy	Converts a date to the number of days elapsed between the first of the specified month and January 1, 0000 (1900 is automatically added to the yy year)
7	dd-mmm	Converts a date to the number of days since the beginning of the year (for example, "01-FEB" to 32)
8	mmm	Converts a 3-letter month abbreviation to a value between 1-12 (for example, "DEC" to 12)
9	{January   February   March ... }	Converts a fully spelled-out month name to a value between 1-12 (for example, "March" to 3)
10	{Sun   Mon   Tue ... }	Converts a 3-day weekday abbreviation to a value between 0-6, where Sunday marks the beginning of the week (for example, "Sun" to 0)
11	{Sunday   Monday   Tuesday ... }	Converts a fully spelled-out weekday name to a value between 0-6, where Sunday marks the beginning of the week (for example, "Monday" to 1)

<b>Conversion Keyword</b>	<b>Format</b>	<b>Description</b>
12	hh:mm:ss {AM   PM}	Converts the time to the number of seconds elapsed since 00:00:00 AM (midnight) (for example, "01:00:00 AM" to 3600)
13	hh:mm:ss	Converts the time to the number of seconds elapsed since 00:00:00 AM (midnight) (for example, "01:00:00" to 3600)
14	hh:mm {AM   PM}	Converts the time to the number of minutes elapsed since 00:00:00 AM (midnight) (for example, "01:00 AM" to 60)
15	hh:mm	Converts the time to the number of minutes elapsed since 00:00:00 AM (midnight) (for example, "01:00" to 60)
16	mm:ss	Converts the time to the number of seconds elapsed since 00:00:00 AM (midnight) (for example, "30:00" to 1800)
17	ddmm	Converts a date to the number of days since the beginning of the year (for example, "3101" to 31)
18	ddmmm	Converts a date to the number of days since the beginning of the year (for example, "31JAN" to 31)
19	ddmmyy	Converts a date to the number of days elapsed since January 1, 0000 (1900 is automatically added to the year if yy is less than or equal to 20; otherwise 2000 is added)
20	ddmmyyyy	Converts a date to the number of days elapsed since January 1, 0000 (for example, "31JAN0000" to 31)
21	ddmmyy	Converts a date to the number of days elapsed since January 1, 0000 (1900 is automatically added to the year if yy is less than or equal to 20; otherwise 2000 is added)
22	ddmmyyyy	Converts a date to the number of days elapsed since January 1, 0000 (for example, "31010000" to 31)
23	mmdd	Converts a date to the number of days since the beginning of the year (for example, "0131" to 31)
24	mmddy	Converts a date to the number of days elapsed since January 1, 0000 (1900 is automatically added to the year if yy is less than or equal to 20; otherwise 2000 is added)
25	mmddyyyy	Converts a date to the number of days elapsed since January 1, 0000 (for example, "01010001" to 366)
26	mmm	Converts a 3-letter month abbreviation to a value between 1-12 (for example, "MAR" to 3) [Note this is the same as conversion keyword 8]

<b>Conversion Keyword</b>	<b>Format</b>	<b>Description</b>
27	mmdd	Converts a date to the number of days since the beginning of the year (for example, "JAN31" to 31)
28	mmddy	Converts a date to the number of days elapsed since January 1, 0000 (1900 is automatically added to the year if yy is less than or equal to 20; otherwise 2000 is added)
29	mmddyyy	Converts a date to the number of days elapsed since January 1, 0000 (for example, "FEB010001" to 32)
30	mmyy	Converts a date to the number of days elapsed between the first of the specified month and January 1, 0000 (1900 is automatically added to the year if yy is less than or equal to 20; otherwise 2000 is added)
31	mmyyyy	Converts a date to the number of days elapsed between the first of the specified month and January 1, 0000 (for example, "FEB0001" to 32)
32	myyy	Converts a date to the number of days elapsed between the first of the specified month and January 1, 0000 (1900 is automatically added to the year if yy is less than or equal to 20; otherwise 2000 is added)
33	myyyy	Converts a date to the number of days elapsed between the first of the specified month and January 1, 0000 (for example, "020001" to 32)
34	yymm	Converts a date to the number of days elapsed between the first of the specified month and January 1, 0000 (1900 is automatically added to the year if yy is less than or equal to 20; otherwise 2000 is added)
35	yymdd	Converts a date to the number of days elapsed since January 1, 0000 (1900 is automatically added to the year if yy is less than or equal to 20; otherwise 2000 is added)
36	yymm	Converts a date to the number of days elapsed between the first of the specified month and January 1, 0000 (1900 is automatically added to the year if yy is less than or equal to 20; otherwise 2000 is added)
37	yymmdd	Converts a date to the number of days elapsed since January 1, 0000 (1900 is automatically added to the year if yy is less than or equal to 20; otherwise 2000 is added)
38	yyyy	Converts the year the number of years elapsed since the year 0000 (for example, "1998" to 1998)

<b>Conversion Keyword</b>	<b>Format</b>	<b>Description</b>
39	yyyymm	Converts a date to the number of days elapsed between the first of the specified month and January 1, 0000 (for example, "000102" to 32)
40	yyyymmdd	Converts a date to the number of days elapsed since January 1, 0000 (for example, "00010201" to 32)
41	yyyymm	Converts a date to the number of days elapsed between the first of the specified month and January 1, 0000 (for example, "000102" to 32)
42	yyyymmdd	Converts a date to the number of days elapsed since January 1, 0000 (for example, "0001FEB01" to 32)
43	<day>* <month>	Converts any delimited date with day followed by month to the number of days elapsed since the beginning of the year (for example, "15-JAN" to 15)
44	<day>* <month>* <year>	Converts any delimited date with day appearing before month followed by year to the number of days elapsed since January 1, 0000 (for example, "1/1/0001" to 366)
45	<month>* <day>	Converts any delimited date with month followed by day to the number of days since the beginning of the year (for example, "JAN 31" to 31)
46	<month>* <day>* <year>	Converts any delimited date with month followed by day followed by year to the number of days elapsed since January 1, 0000 (for example, "JAN 1, 0001" to 366)
47	<month>* <year>	Converts any delimited date with month followed by year to the number of days elapsed between the first of the specified month and January 1, 0000
48	<year>* <month>	Converts any delimited date with year followed by month to the number of days elapsed between the first of the specified month and January 1, 0000
49	<year>* <month>* <day>	Converts any delimited date with month followed by day followed by year to the number of days elapsed since January 1, 0000 (for example, "0001/01/01" to 366)
50	yy	Converts the year to the number of years elapsed since the year 0000 (for example, "97" to 97)
51	mm	Converts the month to a value between 1-12 (for example, "SEP" to 9)
52	dd	Converts the day to a value between 1-31 (for example, "28" to 28)

Conversion Keyword	Format	Description
53	{January   February   March ... }	Converts a fully spelled-out month name to a value between 1-12 (for example, "March" to 3) [Note this is the same as conversion keyword 9]
54	{Sunday   Monday   Tuesday ... }	Converts a fully spelled-out weekday name to a value between 1-7, where Sunday marks the beginning of the week (for example, "Sunday" to 1)
55	{Sun   Mon   Tue ... }	Converts a 3-day weekday abbreviation to a value between 1-7, where Sunday marks the beginning of the week (for example, "Sun" to 1)

## Description

NUMBER converts text values in the specified data range into numerical values using the specified format for converting dates and times. If a text string cannot be parsed using the specified conversion\_keyword, NUMBER will generate an error. Format 0 converts the first five characters of each text string into different number for each unique text string. This is an easy way to change a column of text into unique classes for outputs to a classifier.

The delimited formats (conversion keywords 43-49) support any of the following as delimiters:

- / (slash)
- - (dash)
- , (comma)
- " " (space)
- : (colon)

Months can be represented as mm or mmm; days can be represented as d or dd; years can be represented as yy or yyyy.

**Nota:** In support of year 2000 compliance, all years in dates may be designated as yyyy instead of yy. For backwards compatibility, conversion keywords 1-16, yy (2-digit years) automatically have 1900 added. For conversion keywords 17-55, yy < threshold automatically have 2000 added; yy ≥ threshold automatically have 1900 added.

**Nota:** The year 2000 threshold value is set in the **Data Cleaning** tab of the **Advanced Settings** window (invoke using **Options > Settings > Advanced Settings**).

**Nota:** If you change the value year 2000 threshold value, you must update all macro functions using the NUMBER macro function to manipulate date values with 2-digit years. To force an update of a macro function, you can make any edit (for example, adding a space and deleting it) and clicking the check mark icon to accept the change.

**Nota:** When using format 0, only the first five characters of each text string are used to generate a unique number. All strings with the same first five characters

will be translated to the same numeric value. The same text string will produce the same numerical value every time, even across different spreadsheets. If required, use string macros to manipulate strings so that the first five characters uniquely define a class. Note that the resulting numerical values may be very small. Use the **Display Formats** window to either increase the number of decimal places displayed, or change the format to exponential mode ( 00E+00).

## Examples

TEMP = NUMBER("\$1.23") or TEMP = NUMBER("123%", 2)
Creates a new column named TEMP containing the number 1.23.
TEMP = NUMBER(column("Jan", "Mar", "Dec", 8))
Creates a new column named TEMP containing the numbers 1, 3, and 12.
TEMP = NUMBER("1:52 PM", 14)
Creates a new column named TEMP containing the number 832.
TEMP = NUMBER("1/1/95", 5)
Creates a new column named TEMP containing the number 728660.
TEMP = NUMBER(V1)
Creates a new column named TEMP containing the numeric values of the text strings in column V1. Any dollar values are correctly converted into numerical values. ??? 's returned for text strings that cannot be parsed using the \$ format.
TEMP = NUMBER(V1:V3, 4)
Creates three new columns named TEMP, VX, and VY. The column TEMP contains the numerical values of text strings in column V1. The column VX contains the numerical values of text strings in column V2. The column VY contains the numerical values of text strings in column V3. Any dates in the format dd-mmm-yy are converted into the number of days offset from January 1, 0000. ??? 's are returned for text strings that cannot be parsed using the \$ format.
TEMP = NUMBER(V1[10:20]:V2, 10)
Creates two new columns named TEMP and VX. The column TEMP contains the numerical values of text strings in rows 10-20 of column V1. The column VX contains the numerical values of text strings in rows 10-20 column V2. All standard three character representations of days of the week are converted into the numbers 0-6 (0 = Sunday, 6= Saturday). If there is no match for a weekday name, ??? is returned.
TEMP = NUMBER(V1, 0)
Assuming that column V1 contains all 5-digit text strings, creates one new column named TEMP containing a different numerical value for each unique string.

## Related functions

Function	Description
WEEKDAY	Converts ASCII text date strings to the day of the week

---

## OR macro

The OR macro is available in IBM Campaign and IBM Interact.

## Syntax

data1 OR data2 data1 || data2

## Parameters

data1

The numbers to logical OR with the values in data2. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

data2

The number(s) to logical OR with the values in data1. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. The number of columns in data2 must equal the number of columns in data1, unless data2 is a constant. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

OR calculates the logical OR between the two specified data ranges. It returns a new column for each input column, each containing the corresponding column in data1 logically OR-ed to the corresponding column of data2 (that is, the first column of data1 is logically OR-ed to the first column of data, the second column with the second column, and so on).

If data2 is a constant, each value in data1 is logically OR-ed by that value. If data2 contains one or more columns, the calculations are performed on a row-by-row basis between one column from data1 and one column from data2. The first row of data1 is logically OR-ed to the first row value of data2, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

**Nota:** Using a column containing the same number  $x$  in each row as data2 is the same as using the constant  $x$  as data2.

**Nota:** The OR operator can be abbreviated with a double-vertical bar (||). Use the double-vertical bar to separate the two arguments (for example, to specify V1 OR 3, you can simply type V1 || 3).

## Examples

```
TEMP = 1 OR 8 or TEMP = 1 || 8
```

Creates a new column named TEMP containing the value one (any non-zero number is treated as a one).

```
TEMP = V1 || 1
```

Creates a new column named TEMP containing all ones (every value OR-ed with the number one produces one).



TEMP = V1    V2
Creates a new column named TEMP, where each value is the row value of column V1 logically OR-ed with the corresponding row value of column V2.
TEMP = V1:V3    V4:V6
Creates three new columns named TEMP, VX, and VY. The column TEMP contains the values in V1 logically OR-ed with the corresponding row values of column V4. The column VX contains the logically OR-ed values from columns V2 and V5. The column VY contains the logically OR-ed values from columns V3 and V6.
TEMP = V1[10:20]    V2
Creates a new column named TEMP, where the first 11 cells contain the logical OR-ed result of the values in rows 10-20 of columns V1 and V2. The other cells in TEMP are empty.

## Related functions

Function	Description
AND	Computes the logical AND between two specified data ranges
NOT	Computes the logical NOT of the contents of the specified data range

---

## POSITION macro

The POSITION macro is available only in IBM Campaign.

### Syntax

POSITION(colName, pattern [, start [, occurrence]])

### Parameters

colName

The value of a column (must be string type).

pattern

The pattern, or string, for which you are searching.

start

The byte with which to begin the search.

occurrence

Specify a value for n, where you are searching for the n<sup>th</sup> occurrence of the pattern to return.

## Description

POSITION returns the starting byte position of a pattern, or string, within the value of a column (colName) which must be string type. If start is specified, it begins to search from there. Occurrence is the nth occurrence of pattern to return.

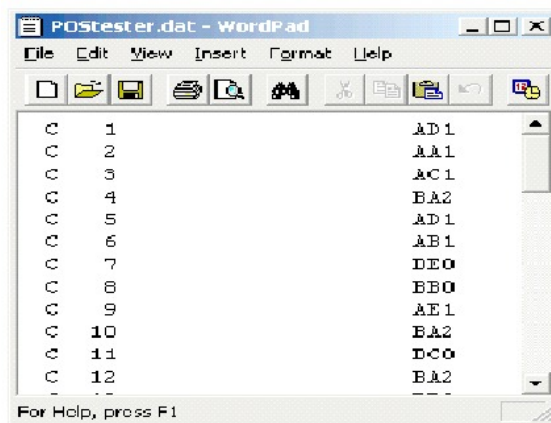
**Nota:** The search is not case sensitive.

## Examples

In the example below, we are searching for the pattern or string, 'A ', within the value of the column, dbo\_BaseInfo.BranchCd, and assigning the returned value to a derived field POSTest.



The following example shows a few rows from the table with the values from dbo\_BaseInfo.BranchCd and POSTest shown side-by-side.



C	1	A.D 1
C	2	A.A 1
C	3	A.C 1
C	4	B.A.2
C	5	A.D 1
C	6	A.B 1
C	7	D.E 0
C	8	B.B 0
C	9	A.E 1
C	10	B.A.2
C	11	D.C 0
C	12	B.A.2

A more complex example:

```
STRING_SEG(POSITION(CellCode,"X",1,2)+1,
```

```
STRING_LENGTH(CellCode),CellCode) = "AAA"
```

This returns rows where the values of CellCode have "AAA " at the end following the second occurrence of "X ".

---

## PLUS macro

The PLUS macro is available in IBM Campaign and IBM Interact.

### Syntax

data PLUS addend data + addend

### Parameters

data

The cell range containing numbers to add. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

addend

The number(s) to add to all values in the specified column. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. The number of columns in data2 must equal the number of columns in data1, unless data2 is a constant. For the format definition of addend (same as data), see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

PLUS adds the values in the two specified data ranges. It returns a new column for each input column, each containing the corresponding column in data1 summed with the corresponding column of data2 (that is, the first column of data1 is added to the first column of data, the second column with the second column, and so on).

If data2 is a constant, each value in data1 increased by that value. If data2 contains one or more columns, the calculations are performed on a row-by-row basis between one column from data1 and one column from data2. The first row of data1 is added to the first row value of data2, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

**Nota:** The PLUS operator can be abbreviated with a plus sign (+).

### Examples

TEMP = 3 PLUS 4 or TEMP = 3 + 4
Creates a new column named TEMP containing the value seven.
TEMP = V1 + 8
Creates a new column named TEMP, where each value is the contents of column V1 plus eight.
TEMP = V1 + V1
Creates a new column named TEMP containing two times the contents of column V1.

TEMP = V1 + V2
Creates a new column named TEMP, where each value is the row value of column V1 plus the corresponding row value of column V2.
TEMP = V1:V3 + V4:V6
Creates three new columns named TEMP, VX, and VY. The column TEMP contains the values in V1 plus the corresponding row values of column V4. The column VX sums columns V2 and V5. The column VY sums column V5 and V6.
TEMP = V1[10:20] + V2 or TEMP = V1[10:20] + V2[1:11]
Creates a new column named TEMP, where the first 11 cells contain the sums of the values in rows 10-20 of column v1 and the values in rows 1-11 of column V2. The other cells in TEMP are empty.

## Related functions

Function	Description
MINUS	Subtracts one specified data range from another
SUM or TOTAL	Computes the sum of a range of cells

---

## POW macro

The POW macro is available in IBM Campaign and IBM Interact.

### Syntax

base POW exponent base ^ exponent

### Parameters

base

The numerical values to raise to an exponential power. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of base (same as data), see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

exponent

The exponential number(s) to raise the values in data by. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. The number of columns in exponent must equal the number of columns in base, unless base is a constant. For the format definition of exponent (same as data), see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

POW raises the values in the first data range to the power specified in the second data range (that is, calculates  $base^{exponent}$ ). It returns one new column for each input column, each containing the result of raising the base to the exponent power

(that is, the first column of data1 is raised to the first column of data, the second column with the second column, and so on).

If exponent is a constant, each value in base is raised by that value. If exponent contains one or more columns, the calculations are performed on a row-by-row basis between one column from base and one column from exponent. The first row of base is raised to the first row value of exponent, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

**Nota:** The POW operator can be abbreviated with a circumflex (^). For example, TEMP = 2^8 is equivalent to TEMP = 2 POW 8.

**Nota:** If the value  $x$  is too large or too small, an overflow is returned. This occurs if  $\text{base}^{\text{exponent}}$  exceeds the maximum or minimum 32-bit floating-point value.

## Examples

TEMP = 2 POW 3 or TEMP = 2^3
Creates a new column named TEMP containing the value eight.
TEMP = V1 ^ 0.5
Creates a new column named TEMP, where each value is the square root of the contents of column V1 (this is equivalent to Sqrt(V1)).
TEMP = V1 ^ V3
Creates a new column named TEMP, where each value is the row value of column V1 raised to the corresponding row value of column V2.
TEMP = V1:V3 ^ V4:V6
Creates three new columns named TEMP, VX, and VY. The column TEMP contains the values in V1 raised to the corresponding row values of column V4. The column VX contains the result of column V2 raised to the corresponding values in column V5. The column VY contains the the result of column V3 raised to the corresponding values of V6.
TEMP = V1[10:20] POW V2 or TEMP = V1[10:20] POW V2[1:11]
Creates a new column named TEMP, where the first 11 cells contain the result of raising the values in rows 10-20 of column V1 by the values in rows 1-10 of column V2. The other cells in TEMP are empty.

## Related functions

Function	Description
EXP	Computes the natural number (e) raised to the contents of each cell in the specified data range
LN or LOG	Computes the natural log of the contents of the specified data range
LN2	Computes the log base2 of the contents of the specified data range
LN10	Computes the log base10 of the contents of the specified data range

---

## RANDOM macro

The RANDOM macro is available only in IBM Campaign.

### Syntax

RANDOM(num [, seed]) RANDOM(num, value1, value2 [, seed])

### Parameters

num

The number of random numbers to generate. This value must be a positive integer greater than zero.

value1

A bound on the random numbers to generate. This can be any constant value or an expression evaluating to a constant. If this parameter is not provided, the default is zero.

value2

The other bound on the random numbers to generate. This can be any constant value or an expression evaluating to a constant. If this parameter is not provided, the default is one.

seed

An optional seed to use for random number generation. This must be an integer.

### Description

RANDOM generates a column of random numbers. It returns one new column containing num random numbers. If value1 and value2 are specified, the random numbers will be generated between (and including) those bounds. If they are not specified, the default is to generate values between zero and one. If seed is provided, it will be used as a seed to the random number generator.

**Nota:** If seed is greater than or equal to  $2^{32}$ , the value is replaced with  $2^{32} - 1$ . Values of seed above  $2^{24}$  will be rounded (that is, precision is lost). Therefore, multiple values may result in the same value of seed.

### Examples

TEMP = RANDOM()
Creates one new column named TEMP containing random numbers of unlimited length.
TEMP = RANDOM(100)
Creates one new column named TEMP containing 100 random numbers between 0.0 and 1.0.
TEMP = RANDOM(100, 5943049)
Creates one new column named TEMP containing 100 random generated from the seed number 5943049.

TEMP = RANDOM(100, 0, 100)
Creates one new column named TEMP containing 100 random numbers between 0 and 100.0.
TEMP = RANDOM(100, 0, 100, 5943049)
Creates one new column named TEMP containing 100 random numbers between -0 and 100 generated from the seed number 5943049.

## Related Functions

Function	Description
RANDOM_GAUSS	Returns the specified number of random values from a Gaussian distribution

---

## RANDOM\_GAUSS macro

The RANDOM\_GAUSS macro is available only in IBM Campaign.

### Syntax

RANDOM\_GAUSS(num [, seed]) RANDOM\_GAUSS(num, mean, std [, seed])

### Parameters

num

The number of random numbers to generate. This value must be a positive integer greater than zero.

mean

The mean of the Gaussian. This can be any constant value or an expression evaluating to a constant. If this parameter is not provided, the default is zero.

std

The standard deviation of the Gaussian. This can be any constant value or an expression evaluating to a constant. If this parameter is not provided, the default is one.

seed

An optional seed to use for random number generation. This must be an integer. (If a non-integer value is supplied, the floor of the value is automatically used instead.)

### Description

RANDOM\_GAUSS generates a column of random numbers based on a Gaussian distribution. It returns one new column containing num random numbers. If mean and std are specified, the random numbers will be generated using a Gaussian distribution with the specified mean and standard deviation. If they are not specified, the default Gaussian has a mean of zero and standard deviation of one.

If seed is provided, it will be used as a seed to the random number generator.

## Examples

<pre>TEMP = RANDOM_GAUSS(100)</pre>
Creates one new column named TEMP containing 100 values randomly sampled from a zero-mean, unit-standard deviation Gaussian.
<pre>TEMP = RANDOM_GAUSS(500, 3)</pre>
Creates one new column named TEMP containing 100 values randomly sampled from a zero-mean, unit-standard deviation Gaussian. The number 3 is used as a seed for the random number generator.
<pre>TEMP = RANDOM_GAUSS(5000, 100, 32)</pre>
Creates one new column named TEMP containing 5000 values randomly sampled from a Gaussian with a mean of 100 and standard deviation of 32.
<pre>TEMP = RANDOM_GAUSS(500, -1, 2, 3)</pre>
Creates one new column named TEMP containing 500 values randomly sampled from a Gaussian with a mean of -1 and a standard deviation of 2. The number 3 is used as a seed for the random number generator.

## Related functions

Function	Description
RANDOM	Returns the specified number of random numbers

---

## ROUND macro

The ROUND macro is available only in IBM Campaign.

### Syntax

ROUND(data)

### Parameters

data

The numerical values to round. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

ROUND rounds the values in the specified data range to the nearest integer. It returns one new column for each input column, each containing the rounded value of numbers in the corresponding input column. Numbers exactly halfway in-between are rounded up (for example, 2.5 is rounded to 3.0 and -2.5 is rounded to -2.0).



## Examples

TEMP = ROUND(3.2)
Creates a new column named TEMP containing the value three.
TEMP = ROUND(V1)
Creates a new column named TEMP, where each value is the rounded value of the contents of column V1.
TEMP = ROUND(V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the rounded values of the contents of column V1, the values of the VX column are the rounded values of the contents of column V2, and the values of the VY column are the rounded values of the contents of column V3.
TEMP = ROUND(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the rounded values in rows 10-20 of column V1. The other cells in TEMP are empty.
TEMP = ROUND(V1[1:5]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the rounded values of the corresponding rows of column V1, and the values in column VX are the rounded values of the corresponding rows of column V2.

## Related functions

Function	Description
INT	Computes the integer value (rounded down) of the contents of the specified data range
MOD	Computes the modulo of the contents of the specified data range
TRUNCATE	Returns the non-fractional part of each value in the specified data range

---

## ROWNUM macro

The ROWNUM macro is available only in IBM Campaign.

### Syntax

ROWNUM()

### Description

ROWNUM generates sequential numbers from one to the number of records. The number for the first record is one, two for the second record, and so on

**Nota:** The maximum number of records that ROWNUM can handle is two billion.

---

## RTRIM macro

The RTRIM macro is available in IBM Campaign and IBM Interact.

## Syntax

RTRIM(data)

## Parameters

data

## Description

RTRIM removes trailing space characters from each string value in the specified data range, returning the converted string. It returns one new column for each input column.

## Examples

```
Temp = RTRIM "gold "
```

Creates a new string named Temp which contains "gold".

---

## SIGN macro

The SIGN macro is available only in IBM Campaign.

## Syntax

SIGN(data)

Parameters

data

The numerical values to compute the sign of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

SIGN tests the sign of the values in the specified data range. It returns one new column for each input column, each containing the sign of numbers in the corresponding input column. Positive one is returned for all values greater than zero; negative one is returned for all values less than zero; zero is returned for values of zero.

## Examples

```
TEMP = SIGN(-3)
```

Creates a new column named TEMP containing the value -1.

```
TEMP = SIGN(V1)
```

Creates a new column named TEMP, where each value is the sign of the contents of column V1.

TEMP = SIGN(V1:V3)

Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the signs of the contents of column V1, the values of the VX column are the signs of the contents of column V2, and the values of the VY column are the signs of the contents of column V3.

TEMP = SIGN(V1[10:20])

Creates a new column named TEMP, where the first 11 cells contain the signs of the values in rows 10-20 of column V1. The other cells in TEMP are empty.

TEMP = SIGN(V1[10:50]:V2)

Creates two new columns named TEMP and VX, each with values in rows 1-41 (the other cells are empty). The values in column TEMP are the signs of the values in rows 10-50 of column V1, and the values in column VX are the signs of the values in rows 10-50 of column V2.

## Related Functions

Function	Description
ABS	Computes the absolute value of the contents of the specified data range
INVERSE	Computes the negative of the contents of the specified data range

---

## SIN macro

The SIN macro is available only in IBM Campaign.

### Syntax

SIN(data [, units\_keyword])

### Parameters

data

The numerical values to compute the sine of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

units\_keyword

This optional keyword determines whether the input values and results are interpreted as degrees or radians. Select one of the following:

RADIAN - Performs the calculations in radians (default)

DEGREE - Performs the calculations in degrees

If this parameter is not specified, the default is radians. (To convert from radians to degrees, divide by PI and multiply by 180.)

For more details on using keywords in IBM Campaign, see “Format Specifications” a pagina 8.

## Description

SIN calculates the sine of values in the specified data range. It returns one new column for each input column, each containing the sine of numbers in the corresponding input column.

## Examples

TEMP = SIN(PI/2) or TEMP = SIN(PI/2, 0) or TEMP = SIGN(PI/2, RADIAN)
Creates a new column named TEMP containing the value one.
TEMP = SIN(V1)
Creates a new column named TEMP, where each value is the sine (in radians) of the contents of column V1.
TEMP = SIN(V1:V3, 1) or TEMP = SIN(V1:V3, DEGREE)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the sines of the contents of column V1, the values of the VX column are the sines of the contents of column V2, and the values of the VY column are the sines of the contents of column V3. All values are in degrees.
TEMP = SIN(V1[10:50]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-41 (the other cells are empty). The values in column TEMP are the sines of the values in rows 10-50 of column V1, and the values in column VX are the sines of the values in rows 10-50 of column V2. All values are in radians.

## Related functions

Function	Description
ASIN	Computes the arcsine of the contents of the specified data range
COS	Computes the cosine of the contents of the specified data range
SINH	Computes the hyperbolic sine of the contents of the specified data range
TAN	Computes the tangent of the contents of the specified data range

---

## SINH macro

The SINH macro is available only in IBM Campaign.

### Syntax

SINH(data [, units\_keyword])

### Parameters

data

The numerical values to compute the hyperbolic sine of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

units\_keyword

This optional keyword determines whether the input values and results are interpreted as degrees or radians. Select one of the following:

RADIAN - Performs the calculations in radians (default)

DEGREE - Performs the calculations in degrees

If this parameter is not specified, the default is radians. (To convert from radians to degrees, divide by PI and multiply by 180.)

For more details on using keywords in IBM Campaign, see "Format Specifications" a pagina 8.

## Description

SINH calculates the hyperbolic sine of the values in the specified data range. It returns one new column for each input column, each containing the hyperbolic sine of numbers in the corresponding input column. For  $x$  in radians, the hyperbolic sine of a number is:

$$\sinh(x) = \frac{e^x - e^{-x}}{2}$$

where  $e$  is the natural number, 2.7182818.

**Nota:** If the value  $x$  is too large, an overflow error is returned. This occurs if  $\sinh(x)$  exceeds the maximum 32-bit floating-point value.

## Examples

TEMP = SINH(1) or TEMP = SINH(1, 0) or TEMP = SINH(1, RADIAN)
Creates a new column named TEMP containing the value 1.18.
TEMP = SINH(V1)
Creates a new column named TEMP, where each value is the hyperbolic sine (in radians) of the contents of column V1.
TEMP = SINH(V1:V3, 1) or TEMP = SINH(V1:V3, DEGREE)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the hyperbolic sines of the contents of column V1, the values of the VX column are the hyperbolic sines of the contents of column V2, and the values of the VY column are the hyperbolic sines of the contents of column V3. All values are in degrees.

TEMP = SINH(V1[10:50]:V2)

Creates two new columns named TEMP and VX, each with values in rows 1-41 (the other cells are empty). The values in column TEMP are the hyperbolic sines of the values in rows 10-50 of column V1, and the values in column VX are the hyperbolic sines of the values in rows 10-50 of column V2. All values are in radians.

## Related functions

Function	Description
COSH	Computes the hyperbolic cosine of the contents of the specified data range
SIN	Computes the sine of the contents of the specified data range
TANH	Computes the hyperbolic tangent of the contents of the specified data range

---

## SQRT macro

The SQRT macro is available only in IBM Campaign.

### Syntax

SQRT(data)

Parameters

data

The numerical values to compute the square root of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

SQRT calculates the square root of the values in the specified data range. It returns one new column for each input column, each containing the positive square root of numbers in the corresponding input column.

**Nota:** If a value in the defined data range is negative, a ??? is returned for that cell.

### Examples

TEMP = SQRT(2)

Creates a new column named TEMP containing the value 1.41.

TEMP = SQRT(V1)

Creates a new column named TEMP, where each value is the square root of the contents of column V1.

TEMP = SQRT(V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the square roots of the contents of column V1, the values of the VX column are the square roots of the contents of column V2, and the values of the VY column are the square roots of the contents of column V3.
TEMP = SQRT(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the square roots of the values in rows 10-20 of column V1. The other cells in TEMP are empty.
TEMP = SQRT(V1[10:50]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-41 (the other cells are empty). The values in column TEMP are the square roots of the values in rows 10-50 of column V1, and the values in column VX are the square roots of the values in rows 10-50 of column V2.

## Related functions

Function	Description
DIV	Divides one specified data range by another
MULT	Multiplies the contents of two data ranges
POW	Computes a base value raised to the specified exponential power(s)

---

## STDV or STDEV macro

The STDV or STDEV macro is available in IBM Campaign and IBM Interact.

### Syntax

STDV(data [, keyword]) STDEV(data [, keyword])

### Parameters

data

The numerical values to compute the standard deviation of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

keyword

This optional keyword determines how the computation is performed over the input data range. Select one of the following:

ALL - Performs the computation on all cells in data (default)

COL - Performs the computation separately for each column of data

ROW - Performs the computation separately for each row of data

For more details on using keywords in IBM Campaign, see “Format Specifications” a pagina 8.

**Nota:** Many macro functions take the keyword parameters {ALL | COL | ROW}. These keywords do not apply in **IBM Campaign** because the input data is always a single column or field. The macro will always behave as if the COL keyword were specified. Therefore, you do not need to specify these keywords when using **IBM Campaign** .

## Description

STDV calculates the standard deviation of all the cells in the specified data range. The standard deviation of a distribution is the square root of the variance. The standard deviation is calculated as follows:

$$\sqrt{\frac{1}{n-1} \sum_{j=1}^n (x_j - \text{mean})^2}$$

where the  $x$ 's are the samples,  $n$  is the number of samples, and  $mean$  is the average of the distribution.

**Nota:** If the number of samples  $n = 1$ , STDV returns an error.

## Examples

TEMP = STDV(V1)	Creates a new column named TEMP containing a single value which is the standard deviation of the contents of column V1.
TEMP = STDV(V1:V3)	Creates a new column named TEMP containing a single value which is the standard deviation of the contents of columns V1, V2, and V3.
TEMP = STDV(V1[1:5]:V4)	Creates a new column named TEMP containing a single value which is the standard deviation of the cells in rows 1-5 of columns V1 through V4.
TEMP = STDV(V1:V3, COL)	Creates three new columns named TEMP, VX, and VY. The single value in the TEMP column is the standard deviation of the contents of column V1, the single value in the VX column is the standard deviation of the contents of column V2, and the single value in the VY column is the standard deviation of the contents of column V3.
TEMP = STDV(V1[10:50]:V3,COL)	Creates three new columns named TEMP, VX, and VY, each containing a single value. The value in column TEMP is the standard deviation of the cells in rows 10-50 of column V1, the value in column VX is the standard deviation of the cells in rows 10-50 of column V2, and the value in column VY is the standard deviation of the cells in rows 10-50 of column V3.



TEMP = STDV(V1:V3, ROW)

Creates a new columns named TEMP where each cell entry is the standard deviation of the corresponding row across columns V1, V2, and V3.

TEMP = STDV(V1[1:5]:V3,ROW)

Creates a new column named TEMP, where the cells in rows 1-5 contain the standard deviations of the corresponding row across columns V1 through V3. The other cells in TEMP are empty.

## Related Functions

Function	Description
VAR	Computes the variance of a range of cells

---

## STRING\_CONCAT macro

The STRING\_CONCAT macro is available in IBM Campaign and IBM Interact.

### Syntax

STRING\_CONCAT(string1, string2, ... stringN)

### Parameters

string

An ASCII text string to concatenate. This can be ASCII text in quotes, a column of text, a cell range containing text, or an expression evaluating to any of the above. See the *Macro Function Parameters* section of the *Using Macros* chapter for your product for the format definition of string (same as data).

### Description

STRING\_CONCAT concatenates the ASCII text values in the specified data ranges. It returns one new column for each input column, each containing the concatenated strings from the corresponding rows of strings. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

**Nota:** The total width of each resulting string cannot exceed 255 characters.

IBM Interact also supports the following syntax:

STRING\_CONCAT( string1 , string2 , ... stringN )

For example, STRING\_CONCAT('a', 'b', 'c', 'd') is valid.

### Examples

TEMP = STRING\_CONCAT("house", "boat")

Creates a new column named TEMP, which contains the ASCII text string "houseboat".

TEMP = STRING_CONCAT(V1, ".")
Creates a new column named TEMP, each row containing the ASCII text string in the corresponding row of column V1 with an appended period.
TEMP = STRING_CONCAT(V1, V2)
Creates a new column named TEMP, each row containing the containing the ASCII text string in column V1 concatenated with the text string in column V2.
TEMP = STRING_CONCAT(V1:V3, V4:V6)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the concatenated strings from the corresponding rows of column V1 and V4, the values of the VX column are the concatenated strings from the corresponding rows of column V2 and V5, and the values of the VY column are the concatenated strings from the corresponding rows of column V3 and V6.
TEMP = STRING_CONCAT(V1[5:10]:V2, V3:V4)
Creates two new columns named TEMP and VX. The values in the TEMP column are strings from rows 5-10 of column V1 concatenated with the rows 1-6 of column V3. The values in VX are the strings from rows 5-10 of column V2 concatenated with the rows 1-6 of column V4.
TEMP = STRING_CONCAT('a', 'b', 'c', 'd')
Creates a new column named TEMP, which contains the ASCII text string "abcd".

## Related Functions

Function	Description
STRING_HEAD	Returns the first n characters of each string in the specified data range
STRING_LENGTH	Returns the length of each string in the specified data range
STRING_SEG	Returns the string segment between two specified indexes
STRING_TAIL	Returns the last n characters of each string in the specified data range

---

## STRING\_HEAD macro

The STRING\_HEAD macro is available only in IBM Campaign.

### Syntax

STRING\_HEAD(num\_chars, data)

### Parameters

num\_chars

The number of characters to returns from the beginning of each string in data. This must be a positive integer greater than zero.

data

ASCII text string values. This can be ASCII text in quotes, a column of text, a cell range containing text, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

STRING\_HEAD returns the first num\_chars characters from each string value in the specified data range. If num\_chars is greater than the number of characters in a text string, the remaining characters are padded with the null character " \0 ".

## Examples

TEMP = STRING_HEAD(3, "JAN 15, 1997")
Creates a new column named TEMP, which contains the ASCII text string " JAN ".
TEMP = STRING_HEAD(10, "Pressure")
Creates a new column named TEMP, which contains the ASCII text string " Pressure ".
TEMP = STRING_HEAD(5, V1)
Creates a new column named TEMP containing the first five characters of each string in column V1.
TEMP = STRING_HEAD(1, V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the first characters of the strings in the corresponding rows of column V1, the values of the VX column are the first characters of strings in corresponding rows of column V2, and the values of the VY column are the first characters of the strings in corresponding rows of column V3.
TEMP = STRING_HEAD(12, V4[1:50]:V6]
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the first 12 characters of the strings in rows 1-50 of column V1, the values of the VX column are the first 12 characters of strings in rows 1-50 of column V2, and the values of the VY column are the first 12 characters of the strings in rows 1-50 of column V3.

## Related functions

Function	Description
STRING_CONCAT	Concatenates two text strings from the specified data ranges
STRING_LENGTH	Returns the length of each string in the specified data range
STRING_SEG	Returns the string segment between two specified indexes
STRING_TAIL	Returns the last n characters of each string in the specified data range

---

## STRING\_LENGTH macro

The STRING\_LENGTH macro is available only in IBM Campaign.

## Syntax

STRING\_LENGTH(data)

Parameters

data

ASCII text string values to compute the length of. This can be ASCII text in quotes, a column of text, a cell range containing text, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

STRING\_LENGTH returns the length of each string value in the specified data range. It returns one new column for each input column, each containing the length of the corresponding text string.

**Nota:** If STRING\_LENGTH is applied to columns containing numerical data, it returns zeros.

## Examples

TEMP = STRING_LENGTH("four")
Creates a new column named TEMP containing the value 4.
TEMP = STRING_LENGTH(4)
Creates a new column named TEMP containing the value 0.
TEMP = STRING_LENGTH(V1)
Creates a new column named TEMP, where each value is the length of the string in the corresponding row of column V1.
TEMP = STRING_LENGTH(V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the lengths of the strings in the corresponding rows of column V1, the values of the VX column are the lengths of strings in corresponding rows of column V2, and the values of the VY column are the lengths of the strings in corresponding rows of column V3.
TEMP = STRING_LENGTH(V4[1:50]:V6]
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the lengths of the strings in rows 1-50 of column V1, the values of the VX column are the lengths of strings in rows 1-50 of column V2, and the values of the VY column are the lengths of the strings in rows 1-50 of column V3.

## Related functions

Function	Description
STRING_CONCAT	Concatenates two text strings from the specified data ranges
STRING_HEAD	Returns the first n characters of each string in the specified data range

Function	Description
STRING_SEG	Returns the string segment between two specified indexes
STRING_TAIL	Returns the last n characters of each string in the specified data range

---

## STRING\_PROPER macro

The STRING\_PROPER macro is available only in IBM Campaign.

### Syntax

STRING\_PROPER(data)

### Parameters

data

The string value to convert.

### Description

STRING\_PROPER converts each string value in the specified data range by changing the first letter or any letter that follows a white space character or symbol (other than underscore) into uppercase, and all other characters to lowercase. It returns one new column for each input column, each containing the converted string in the corresponding input column.

### Examples

Temp = STRING_PROPER
----------------------

---

## STRING\_SEG macro

The STRING\_SEG macro is available only in IBM Campaign.

### Syntax

STRING\_SEG(from, to, data)

### Parameters

from

The number of characters offset from the beginning of the string to start extracting the string segment from. This must be a positive integer greater than zero and less than to, or STRING\_SEG returns an empty string.

to

The number of characters offset from the beginning of the string to stop extracting the string segment from. This must be a positive integer greater than or equal to from. If to equals from (and to is less than or equal to the length of the string), one character is returned.

data

ASCII text string values. This can be ASCII text in quotes, a column of text, a cell range containing text, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

## Description

STRING\_SEG returns the string segment between two indexes from each string value in the specified data range. If from is greater than the length of a string, nothing is returned. If to is greater than the length of a string, all characters from from are returned.

## Examples

TEMP = STRING_SEG(1, 6, "JAN 15, 1997")
Creates a new column named TEMP, which contains the ASCII text string " Jan 15 ".
TEMP = STRING_SEG(5, 20, "Pressure")
Creates a new column named TEMP, which contains the ASCII text string " sure ".
TEMP = STRING_SEG(5, 6, V1)
Creates a new column named TEMP containing the fifth and sixth characters of each string in column V1.
TEMP = STRING_SEG(10, 20, V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are characters 10-20 of the strings in the corresponding rows of column V1, the values of the VX column are the characters 10-20 of strings in corresponding rows of column V2, and the values of the VY column are the characters 10-20 of the strings in corresponding rows of column V3.
TEMP = STRING_SEG(5, 10, V4[1:50]:V6]
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are characters 5-10 of the strings in rows 1-50 of column V1, the values of the VX column are characters 5-10 of strings in rows 1-50 of column V2, and the values of the VY column are characters 5-10 of the strings in rows 1-50 of column V3.

## Related functions

Function	Description
STRING_CONCAT	Concatenates two text strings from the specified data ranges
STRING_HEAD	Returns the first n characters of each string in the specified data range
STRING_LENGTH	Returns the length of each string in the specified data range

Function	Description
STRING_TAIL	Returns the last n characters of each string in the specified data range

---

## STRING\_TAIL macro

The STRING\_TAIL macro is available only in IBM Campaign.

### Syntax

STRING\_TAIL(num\_chars, data)

### Parameters

num\_chars

The number of characters to return from the end of each string in data. This must be a positive integer greater than zero.

data

ASCII text string values. This can be ASCII text in quotes, a column of text, a cell range containing text, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

STRING\_TAIL returns the last num\_chars characters from each string value in the specified data range. All string values are padded to the length of the longest string with null characters "\0". Then the last num\_chars are returned from each string. If num\_chars is greater than the number of characters in a text string, the entire text string is returned.

### Examples

TEMP = STRING_TAIL(3, "JAN 15, 1997")
Creates a new column named TEMP, which contains the ASCII text string " 997".
TEMP = STRING_TAIL(10, "Pressure")
Creates a new column named TEMP, which contains the ASCII text string " Pressure".
TEMP = STRING_TAIL(5, V1)
Creates a new column named TEMP containing the last five characters of each string in column V1.
TEMP = STRING_TAIL(1, V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the last characters of the strings in the corresponding rows of column V1, the values of the VX column are the last characters of strings in corresponding rows of column V2, and the values of the VY column are the last characters of the strings in corresponding rows of column V3.

```
TEMP = STRING_TAIL(12, V4[1:50]:V6]
```

Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the last 12 characters of the strings in rows 1-50 of column V1, the values of the VX column are the last 12 characters of strings in rows 1-50 of column V2, and the values of the VY column are the last 12 characters of the strings in rows 1-50 of column V3.

## Related functions

Function	Description
STRING_CONCAT	Concatenates two text strings from the specified data ranges
STRING_HEAD	Returns the first n characters of each string in the specified data range
STRING_LENGTH	Returns the length of each string in the specified data range
STRING_SEG	Returns the string segment between two specified indexes

---

## SUBSTR or SUBSTRING macro

The SUBSTR or SUBSTRING macro is available in IBM Campaign and IBM Interact.

### Syntax

```
SUBSTR(string_value, start_pos[, nchars]) or SUBSTR(string_value FROM  
start_pos[ FOR nchars]) SUBSTRING(string_value, start_pos[, nchars]) or  
SUBSTRING(string_value FROM start_pos[ FOR nchars])
```

### Parameters

*string\_value*

The string from which a substring will be taken.

*start\_pos*

The starting character from each substring will be extracted.

*nchars*

The number of characters to be extracted (must be greater than or equal to 0). If this value is not provided, all remaining characters in *string\_value* are extracted.

### Description

SUBSTR or SUBSTRING extracts *nchars* characters from the string, starting at *start\_pos*. If *nchars* is omitted, SUBSTR and SUBSTRING extracts characters from *start\_pos* through the end of the string. Trailing spaces are automatically truncated. To avoid syntax errors, be sure to separate numeric values with a comma and a space, as shown in the examples.



**Important:** IBM Interact supports the following formats only:  
SUBSTR(string\_value, start\_pos[, nchars]) or SUBSTRING(string\_value,  
start\_pos[, nchars])

## Examples

SUBSTR SUBSTR Returns	("abcdef" FROM 1 FOR 2) ("abcdef", 1, 2) 'ab'
SUBSTR SUBSTR Returns	("abcdef" FROM -2 FOR 4) ("abcdef", -2, 4) 'a'
SUBSTR SUBSTR Returns	("abcdef" FROM 3) ("abcdef", 3) 'cdef'

---

## SUM macro

The SUM macro is available in IBM Campaign and IBM Interact.

### Syntax

SUM(data [, keyword])

### Parameters

data

The numerical values to compute the sum of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

keyword

This optional keyword determines how the computation is performed over the input data range. Select one of the following:

ALL - Performs the computation on all cells in data (default)

COL - Performs the computation separately for each column of data

ROW - Performs the computation separately for each row of data

For more details on using keywords in IBM Campaign, see "Format Specifications" a pagina 8.

**Nota:** Many macro functions take the keyword parameters {ALL | COL | ROW}. These keywords do not apply in IBM Campaign because the input data is always a single column or field. The macro will always behave as if the COL keyword were specified. Therefore, you do not need to specify these keywords when using IBM Campaign .

### Description

SUM calculates the sum of all the cells in the specified data range. It returns a single column.

**Nota:** SUM is the same as the TOTAL macro function.

## Examples

<code>TEMP = SUM(3)</code>	Creates a new column named TEMP containing the value three.
<code>TEMP = SUM((COLUMN(3, 5, 1))</code>	
	Creates a new column named TEMP containing the value nine.
<code>TEMP = SUM(V1)</code>	
	Creates a new column named TEMP containing a single value which is the sum of the contents of column V1.
<code>TEMP = SUM(V1:V3)</code>	
	Creates a new column named TEMP containing a single value which is the sum of the contents of columns V1, V2, and V3.
<code>TEMP = SUM(V1[1:5]:V4)</code>	
	Creates a new column named TEMP containing a single value which is the sum of the cells in rows 10-20 of columns V1 through V4.
<code>TEMP = SUM(V1:V3, COL)</code>	
	Creates three new columns named TEMP, VX, and VY. The single value in the TEMP column is the sum of the contents of column V1, the single value in the VX column is the sum of the contents of column V2, and the single value in the VY column is the sum of the contents of column V3.
<code>TEMP = SUM(V1[1:5]:V3, COL)</code>	
	Creates three new columns named TEMP, VX, and VY, each containing a single value. The value in column TEMP is the sum of the cells in rows 1-5 of column V1, the value in column VX is the sum of the cells in rows 1-5 of column V2, and the value in column VY is the sum of the cells in rows 1-5 of column V3.
<code>TEMP = SUM(V1:V3, ROW)</code>	
	Creates a new columns named TEMP, where each cell entry is the sum of the corresponding row across columns V1, V2, and V3.
<code>TEMP = SUM(V1[1:5]:V3, ROW)</code>	
	Creates a new column named TEMP, where the cells in rows 1-5 contain the sum of the corresponding row across columns V1 through V3. The other cells in TEMP are empty.

## Related functions

Function	Description
AVG or MEAN	Computes the arithmetic mean or average of a range of cells

---

## TAN macro

The TAN macro is available only in IBM Campaign.

### Syntax

`TAN(data [, units_keyword])`

## Parameters

data

The numerical values to compute the tangent of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

units\_keyword

This optional keyword determines whether the input values and results are interpreted as degrees or radians. Select one of the following:

RADIAN - Performs the calculations in radians (default)

DEGREE - Performs the calculations in degrees

If this parameter is not specified, the default is radians. (To convert from radians to degrees, divide by PI and multiply by 180.)

For more details on using keywords in IBM Campaign, see "Format Specifications" a pagina 8.

## Description

TAN calculates the tangent of the values in the specified data range. It returns one new column for each input column each containing the tangent of numbers in the corresponding input column.

## Examples

<pre>TEMP = TAN(PI/4) or TEMP = TAN(PI/4, 0) or TEMP = TAN(PI/4, RADIAN)</pre>
<p>Creates a new column named TEMP containing the value one.</p>
<pre>TEMP = TAN(V1)</pre>
<p>Creates a new column named TEMP, where each value is the tangent (in radians) of the contents of column V1.</p>
<pre>TEMP = TAN(V1:V3, 1) or TEMP = TAN(V1:V3, DEGREE)</pre>
<p>Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the tangents of the contents of column V1, the values of the VX column are the tangents of the contents of column V2, and the values of the VY column are the tangents of the contents of column V3. All values are in degrees.</p>
<pre>TEMP = TAN(V1[1:5]:V2)</pre>
<p>Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the tangents of the corresponding rows of column V1, and the values in column VX are the tangents of the corresponding rows of column V2. All values are in radians.</p>

## Related functions

Function	Description
ATAN	Computes the arctangent of the contents of the specified data range
COS	Computes the cosine of the contents of the specified data range
COT	Computes the cotangent of the contents of the specified data range
SIN	Computes the sine of the contents of the specified data range
TANH	Computes the hyperbolic tangent of the contents of the specified data range

---

## TANH macro

The TANH macro is available only in IBM Campaign.

### Syntax

TANH(data [, units\_keyword])

### Parameters

data

The numerical values to compute the hyperbolic tangent of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

units\_keyword

This optional keyword determines whether the input values and results are interpreted as degrees or radians. Select one of the following:

RADIAN - Performs the calculations in radians (default)

DEGREE - Performs the calculations in degrees

If this parameter is not specified, the default is radians. (To convert from radians to degrees, divide by PI and multiply by 180.)

For more details on using keywords in IBM Campaign, see "Format Specifications" a pagina 8.

### Description

TANH calculates the hyperbolic tangent of the values in the specified data range. It returns one new column for each input column, each containing the hyperbolic tangent of numbers in the corresponding input column. The hyperbolic tangent of a number is calculated as follows:

$$\tanh(x) = \frac{\sinh(x)}{\cosh(x)}$$

**Nota:** If the value  $x$  is too large, an overflow error is returned. This occurs if  $\tanh(x)$  exceeds the maximum 32-bit floating-point value. If  $\cosh(x)$  is zero, **TANH** returns the maximum 32-bit floating point value.

### Examples

TEMP = TANH(PI) or TEMP = TANH(PI, 0) or TEMP = TANH(PI, RADIAN)
Creates a new column named TEMP containing the value one.
TEMP = TANH(V1)
Creates a new column named TEMP, where each value is the hyperbolic tangent (in radians) of the contents of column V1.
TEMP = TANH(V1:V3, 1) or TEMP = TANH(V1:V3, DEGREE)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the hyperbolic tangents of the contents of column V1, the values of the VX column are the hyperbolic tangents of the contents of column V2, and the values of the VY column are the hyperbolic tangents of the contents of column V3. All values are in degrees.
TEMP = TANH(V1[1:5]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-5 (the other cells are empty). The values in column TEMP are the hyperbolic tangents of the corresponding rows of column V1, and the values in column VX are the hyperbolic tangents of the corresponding rows of column V2. All values are in radians.

### Related functions

Function	Description
ATAN	Computes the arctangent of the contents of the specified data range
COSH	Computes the hyperbolic cosine of the contents of the specified data range
COT	Computes the cotangent of the contents of the specified data range
SINH	Computes the hyperbolic sine of the contents of the specified data range
TAN	Computes the tangent of the contents of the specified data range

---

## TOTAL macro

The TOTAL macro is available in IBM Campaign and IBM Interact.

### Syntax

TOTAL(data [, keyword])

## Parameters

data

The numerical values to compute the sum of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

keyword

This optional keyword determines how the computation is performed over the input data range. Select one of the following:

ALL - Performs the computation on all cells in data (default)

COL - Performs the computation separately for each column of data

ROW - Performs the computation separately for each row of data

For more details on using keywords in IBM Campaign, see "Format Specifications" a pagina 8.

**Nota:** Many macro functions take the keyword parameters {ALL | COL | ROW}. These keywords do not apply in IBM Campaign because the input data is always a single column or field. The macro will always behave as if the COL keyword were specified. Therefore, you do not need to specify these keywords when using IBM Campaign .

## Description

TOTAL calculates the sum of all the cells in the specified data range.

**Nota:** TOTAL is the same as the SUM macro function.

## Examples

TEMP = TOTAL(3)	Creates a new column named TEMP containing the value three.
TEMP = TOTAL((COLUMN(3, 5, 1)))	Creates a new column named TEMP containing the value nine.
TEMP = TOTAL(V1)	Creates a new column named TEMP containing a single value which is the sum of the contents of column V1.
TEMP = TOTAL(V1:V3)	Creates a new column named TEMP containing a single value which is the sum of the contents of columns V1, V2, and V3.
TEMP = TOTAL(V1[1:5]:V4)	Creates a new column named TEMP containing a single value which is the sum of the cells in rows 10-20 of columns V1 through V4.

TEMP = TOTAL(V1:V3, COL)
Creates three new columns named TEMP, VX, and VY. The single value in the TEMP column is the sum of the contents of column V1, the single value in the VX column is the sum of the contents of column V2, and the single value in the VY column is the sum of the contents of column V3.
TEMP = TOTAL(V1[1:5]:V3, COL)
Creates three new columns named TEMP, VX, and VY, each containing a single value. The value in column TEMP is the sum of the cells in rows 1-5 of column V1, the value in column VX is the sum of the cells in rows 1-5 of column V2, and the value in column VY is the sum of the cells in rows 1-5 of column V3.
TEMP = TOTAL(V1:V3, ROW)
Creates a new columns named TEMP where each cell entry is the sum of the corresponding row across columns V1, V2, and V3.
TEMP = TOTAL(V1[1:5]:V3, ROW)
Creates a new column named TEMP, where the cells in rows 1-5 contain the sum of the corresponding row across columns V1 through V3. The other cells in TEMP are empty.

## Related functions

Function	Description
AVG or MEAN	Computes the arithmetic mean or average of a range of cells

---

## TRUNCATE macro

The TRUNCATE macro is available only in IBM Campaign.

### Syntax

TRUNCATE(data)

### Parameters

data

The numerical values to truncate. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

TRUNCATE calculates the whole part of each value in the specified data range. It returns one new column for each input column, each containing the whole number (non-fractional) part of the numbers in the corresponding input column.

**Nota:** The FRACTION macro function and the TRUNCATE macro function are complementary in that they sum to the original values.

## Examples

TEMP = TRUNCATE(4.3)
Creates a new column named TEMP containing the value 4.
TEMP = TRUNCATE(2.9)
Creates a new column named TEMP containing the value -2.
TEMP = TRUNCATE(V1)
Creates a new column named TEMP, where each value is the fractional part of the contents of column V1.
TEMP = TRUNCATE(V1:V3)
Creates three new columns named TEMP, VX, and VY. The values in the TEMP column are the truncated parts of column V1, the values of the VX column are the truncated parts of column V2, and the values of the VY column are the truncated parts of column V3.
TEMP = TRUNCATE(V1[10:20])
Creates a new column named TEMP, where the first 11 cells contain the truncated parts of the values in rows 10-20 of column V1. The other cells in TEMP are empty.
TEMP = TRUNCATE(V1[50:99]:V2)
Creates two new columns named TEMP and VX, each with values in rows 1-50 (the other cells are empty). The values in column TEMP are the truncated parts of the rows of column V1, and the values in column VX are the truncated parts of the values in column V2.

## Related functions

Function	Description
CEILING	Computes the ceiling of each value in the specified data range
FLOOR	Computes the floor of each value in the specified data range
FRACTION	Returns the fractional part of each value in the specified data range

---

## UPPER macro

The UPPER macro is available in IBM Campaign and IBM Interact.

### Syntax

UPPER(data)

### Parameters

data

The string value to be converted to uppercase.



## Description

UPPER converts each string value in the specified data range to uppercase. It returns one new column for each input column, each containing the uppercase string in the corresponding input column.

## Examples

Temp = UPPER "gold"
Creates a new column named Temp containing "GOLD".
TEMP = UPPER( "jan 15, 1997")
Creates a new column named TEMP, which contains the ASCII text string " JAN 15, 1997 ".
TEMP = UPPER( "Pressure")
Creates a new column named TEMP, which contains the ASCII text string "PRESSURE".
TEMP = UPPER(V1)
Creates a new column named TEMP containing uppercase characters of each string in column V1.

---

## VARIANCE macro

The VARIANCE macro is available only in IBM Campaign.

### Syntax

VARIANCE(data [, keyword])

### Parameters

data

The numerical values to compute the variance of. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

keyword

This optional keyword determines how the computation is performed over the input data range. Select one of the following:

ALL - Performs the computation on all cells in data (default)

COL - Performs the computation separately for each column of data

ROW - Performs the computation separately for each row of data

For more details on using keywords in IBM Campaign, see "Format Specifications" a pagina 8.

**Nota:** Many macro functions take the keyword parameters {ALL | COL | ROW}. These keywords do not apply in **IBM Campaign** because the input data is always

a single column or field. The macro will always behave as if the COL keyword were specified. Therefore, you do not need to specify these keywords when using **IBM Campaign**.

## Description

VARIANCE calculates the variance of all the values in the specified data range. Variance is the standard deviation squared. The variance is calculated as follows:

$$\frac{1}{n-1} \sum_{j=1}^n (x_j - \text{mean})^2$$

where the  $x$ 's are the samples,  $n$  is the number of samples, and *mean* is the average of the distribution.

**Nota:** If the number of samples  $n = 1$ , VARIANCE returns an error.

## Examples

TEMP = VARIANCE(V1)
Creates a new column named TEMP containing a single value which is the variance of the contents of column V1.
TEMP = VARIANCE(V1:V3)
Creates a new column named TEMP containing a single value which is the variance of the contents of columns V1, V2, and V3.
TEMP = VARIANCE(V1[10:20])
Creates a new column named TEMP containing a single value which is the variance of the cells in rows 10-20 of column V1.
TEMP = VARIANCE(V1[1:5]:V4)
Creates a new column named TEMP containing a single value which is the variance of the cells in rows 1-5 of columns V1 through V4.
TEMP = VARIANCE(V1:V3, COL)
Creates three new columns named TEMP, VX, and VY. The single value in the TEMP column is the variance of the contents of column V1, the single value in the VX column is the variance of the contents of column V2, and the single value in the VY column is the variance of the contents of column V3.
TEMP = VARIANCE_(V1[1:5]:V3, COL) or TEMP = VARIANCE(V1[1:5]:V3[1:5], COL)
Creates three new columns named TEMP, VX, and VY, each containing a single value. The value in column TEMP is the variance of the cells in rows 1-5 of column V1, the value in column VX is the variance of the cells in rows 1-5 of column V2, and the value in column VY is the variance of the cells in rows 1-5 of column V3.
TEMP = VARIANCE(V1:V3, ROW)
Creates a new column named TEMP where each cell entry is the variance of the corresponding row across columns V1, V2, and V3.

```
TEMP = VARIANCE(V1[1:5]:V3,ROW) or TEMP = VARIANCE(V1[1:5]:V3[1:5], ROW)
```

Creates a new column named TEMP, where the cells in rows 1-5 contain the variance of the corresponding row across columns V1 through V3. The other cells in TEMP are empty.

---

## WEEKDAY macro

The WEEKDAY macro is available only in IBM Campaign.

### Syntax

```
WEEKDAY(data [, conversion_keyword])
```

### Parameters

data

The ASCII text dates to convert to numerical values representing days of the week (1-7). This can be ASCII text in quotes, a column of text, a cell range containing text, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

conversion\_keyword

This optional keyword specifies how to interpret text formats for dates and times. Select one of the following:

- 1 - mm/dd/yy (default)
- 2 - dd-mmm-yy
- 3 - mm/dd/yy hh:mm

If this parameter is not specified, the default is 1.

### Description

WEEKDAY converts text values in the specified data range into numerical values representing days of the week using the specified format for converting dates and times. The number 0 for Sunday, a 1 for Monday, and so on up to 6 for Saturday. If a text string cannot be parsed using the specified conversion\_keyword, WEEKDAY will return an error.

### Examples

```
TEMP = WEEKDAY("1/1/95")
```

Creates a new column named TEMP containing the number 0 (January 1, 1995 is a Sunday).

```
TEMP = WEEKDAY(V1, 2)
```

Creates a new column named TEMP containing numbers for the days of the week for the text strings in column V1. All text strings in column V1 are expected to be of the form dd-mmm-yy (otherwise ??? 's are returned).

```
TEMP = WEEKDAY(V1:V3, 3)
```

Creates three new columns named TEMP, VX, and VY. The column TEMP contains numbers representing the days of the week of text strings in column V1. The column VX contains numbers representing the days of the week of text strings in column V2. The column VY contains numbers representing the days of the week of text strings in column V3. All text strings in columns V1 - V3 are expected to be of the form mm/dd/yy hh:mm (otherwise ??? 's are returned).

```
TEMP = WEEKDAY(V1[10:20]:V2, 10)
```

Creates two new columns named TEMP and VX. The column TEMP contains the numbers representing the days of the week of text strings in rows 10-20 of column V1. The column VX contains the numbers representing the days of the week of text strings in rows 10-20 column V2. All text strings are expected to be of the form mm/dd/yy (otherwise ??? 's are returned).

## Related functions

Function	Description
NUMBER	Converts ASCII text strings for times and dates to numerical values

---

## WEEKDAYOF macro

The WEEKDAYOF macro is available only in IBM Campaign.

### Syntax

```
WEEKDAYOF(date_string [, input_format])
```

### Parameters

date\_string

A text representing a valid date.

input\_format

One of the keywords in the table below, specifying the date format of date\_string.

### Description

WEEKDAYOF returns the day of the week as a number between 0-6 (Sunday 0, Monday 1, and so on) for the date specified by the date\_string. If input\_format is not provided, the default keyword DELIM\_M\_D\_Y will be used.

### Examples

WEEKDAYOF("08312000", MMDDYYYY) returns the number 4, since Thursday is the 4th day of the week.

**Nota:** See "DATE" a pagina 50 for additional information on valid date formats.

## Related functions

Function	Description
DAYOF	Returns the day of the month as a number.
MONTHOF	Returns the month of the year as a number.
YEAROF	Returns the year as a number.

---

## XOR macro

The XOR macro is available in IBM Campaign and IBM Interact.

### Syntax

```
data1 XOR data2
```

### Parameters

data1

The non-negative integers to bitwise XOR with the values in data2. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

data2

The non-negative integer(s) to bitwise XOR with the values in data1. This can be a constant value, a column, a cell range, or an expression evaluating to any of the above. The number of columns in data2 must equal the number of columns in data1, unless data2 is a constant. For the format definition of data, see the "Macro Function Parameters" section in the chapter in this guide for your IBM product.

### Description

XOR performs a bitwise XOR between the two specified data ranges. It returns a new column for each input column, each containing the corresponding column in data1 bitwise XOR-ed to the corresponding column of data2 (that is, the first column of data1 is bitwise XOR-ed to the first column of data, the second column with the second column, and so on).

If data2 is a constant, each value in data1 is bitwise XOR-ed by that value. If data2 contains one or more columns, the calculations are performed on a row-by-row basis between one column from data2 and one column from data1. The first row of data1 is bitwise XOR-ed to the first row value of data2, the second row with the second row, and so on. This row-by-row calculation produces a result for each row up to the last value of the shortest column.

**Nota:** Precision for this macro function is limited to integer values less than  $2^{24}$ . No negative values are allowed.

## Examples

<code>TEMP = 3 XOR 7</code>
Creates a new column named TEMP containing the value four (bitwise XOR of 011 and 111 equals 100).
<code>TEMP = V1 XOR 8</code>
Creates a new column named TEMP, where each value is the contents of column V1, bitwise XOR-ed with the binary value 1000.
<code>TEMP = V1 XOR V1</code>
Creates a new column named TEMP containing all zeros (every value XOR-ed with itself produces zero).
<code>TEMP = V1 XOR V2</code>
Creates a new column named TEMP, where each value is the row value of column V1 bitwise XOR-ed with the corresponding row value of column V2.
<code>TEMP = V1:V3 XOR V4:V6</code>
Creates three new columns named TEMP, VX, and VY. The column TEMP contains the values in V1 bitwise XOR-ed with the corresponding row values of column V4. The column VX contains the bitwise XOR-ed values from columns V2 and V5. The column VY contains the bitwise XOR-ed values from columns V3 and V6.
<code>TEMP = V1[10:20] XOR V2</code> or <code>TEMP = V1[10:20] XOR V2[1:11]</code>
Creates a new column named TEMP, where the first 11 cells contain the bitwise XOR-ed result of the values in rows 10-20 of column V1 by the values in rows 1-11 of column V2. The other cells in TEMP are empty.

## Related functions

Function	Description
BIT_AND	Computes the bitwise AND between two specified data ranges
BIT_NOT	Computes the bitwise NOT of the contents of the specified data range
BIT_OR	Computes the bitwise OR between two specified data ranges

---

## YEAROF macro

The YEAROF macro is available only in IBM Campaign.

### Syntax

`YEAROF(date_string [, input_format])`

### Parameters

`date_string`

A text representing a valid date.

`input_format`

One of the keywords in the table below, specifying the date format of `date_string`.

### Description

`YEAROF` returns the year as a number for the date specified by the `date_string`. If `input_format` is not provided, the default keyword `DELIM_M_D_Y` will be used.

### Examples

`YEAROF("31082000", DDMMYYYY)` returns the number 2000.

For additional information on valid date formats, see “DATE” a pagina 50.

### Related functions

Function	Description
<code>DAYOF</code>	Returns the day of the month as a number.
<code>MONTHOF</code>	Returns the month of the year as a number.
<code>WEEKDAYOF</code>	Returns the day of the week as a number.





---

## Before you contact IBM technical support

If you encounter a problem that you cannot resolve by consulting the documentation, your company's designated support contact can log a call with IBM technical support. Use these guidelines to ensure that your problem is resolved efficiently and successfully.

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**Nota:** Technical Support does not write or create API scripts. For assistance in implementing our API offerings, contact IBM Professional Services.

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Before you contact IBM technical support, gather the following information:

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- Detailed error messages that you see when the issue occurs.
- Detailed steps to reproduce the issue.
- Related log files, session files, configuration files, and data files.
- Information about your product and system environment, which you can obtain as described in "System information."

### System information

When you call IBM technical support, you might be asked to provide information about your environment.

If your problem does not prevent you from logging in, much of this information is available on the About page, which provides information about your installed IBM applications.

You can access the About page by selecting **Help > About**. If the About page is not accessible, check for a `version.txt` file that is located under the installation directory for your application.

### Contact information for IBM technical support

For ways to contact IBM technical support, see the IBM Product Technical Support website: ([http://www.ibm.com/support/entry/portal/open\\_service\\_request](http://www.ibm.com/support/entry/portal/open_service_request)).

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