

Sulprobil.xll User Guide

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1. Introduction

Please notice that this Excel© add-in is work in progress. Normally I will only extend its set of functions. But there is a fair chance that I will alter some functions if I realize that a different argument or a changed functionality could improve it.

At first I intend to add functions which will only perform independent calculations based on the input arguments and which use the C++ STL and Boost functionality. `sbVector`, for example, offers a nice and decent way to get rid of the incredibly stupid Excel © worksheet way to create array constants like `{1;2;3}`, which is `=ROW(INDIRECT("1:3"))`. This worksheet function solution is volatile, i. e. it's being re-evaluated each time Excel recalculates.

Secondly I would like to offer functions which also make efficient use of the Excel © environment.

Then we will see.

Please notice that I will use the description `sbVector(count, [is_horizontal], [start], [inc])` as a shortcut for `sbVector(count [[, [is_horizontal]], [start]], [inc])` to indicate optional arguments, for example. This is to increase readability.

Mottingham, 20th January 2010

Bernd Plumhoff

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2. Functions

2.1 sbCat(input , [delimiter] , [skip_empty])

sbCat concatenates all cells of the input range, delimited by the given delimiter. If skip_empty is TRUE empty cells will not be added

Arguments:

input – a range of cell elements or an input array

[optional] delimiter – string which will delimit the concatenated cells

[optional] skip_empty – TRUE: do not concatenate empty cells
FALSE: empty cells will lead to consecutive delimiters

Result:

A string

Examples: Cell B2 is empty

	A	B	C	D
1	9	7	Mno	Def
2	8		Ghi	Jkl

=sbCat(A1:B2) will return 978 (as a string, not as a number)

=sbCat(A1:C1,",") will return 9,7,Mno

=sbCat(A2:C2,",") will return 8,,Ghi

=sbCat(A2:C2,",",TRUE) will return 8,Ghi

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2.2 sbMax(input , [is_alphanum] , [partial])

sbMax returns the numerical or alpha-numerical [overall/row/column] maximum of its input

Arguments:

input – a range of cell elements or an input array

[optional] is_alphanum – boolean value: FALSE (the default) will return the numerical maximum, TRUE returns the alpha-numerical (string) maximum

[optional] partial – 0 indicates overall maximum
1 means row-wise maximum
2 means column-wise maximum

Result:

A cell or a cell range with numerical or with string values

Examples:

	A	B	C	D
1	9	7	Mno	Def
2	8	3	Ghi	Jkl

=sbMax(A1:B2) will return 9, the numerical maximum of the input range

=sbMax(A1:B2,,1) will return the vertical array {9;8}, the numerical row maxima of the input range

=sbMax(C1:D2,TRUE,2) will return the horizontal array {"Mno","Jkl"}, the alphanumerical (string) column maxima of the input range

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2.3 sbMin(input , [is_alphanum] , [partial])

sbMin returns the numerical or alpha-numerical [overall/row/column] minimum of its input

Arguments:

input – a range of cell elements or an input array

[optional] is_alphanum – boolean value: FALSE (the default) will return the numerical minimum, TRUE returns the alpha-numerical (string) minimum

[optional] partial – 0 indicates overall minimum

1 means row-wise minimum

2 means column-wise minimum

Result:

A cell or a cell range with numerical or with string values

Examples:

	A	B	C	D
1	5	6	Abc	Def
2	7	8	Ghi	Jkl

=sbMin(A1:B2) will return 5, the numerical minimum of the input range

=sbMin(A1:B2,,1) will return the vertical array {5;7}, the numerical row minima of the input range

=sbMin(C1:D2,TRUE,2) will return the horizontal array {"Abc","Def"}, the alphanumerical (string) column minima of the input range

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2.4 sbMmult(input_A, input_B)

sbMmult multiplies two matrices. Number of columns of input matrix A has to be equal to number of rows of input matrix B. This command is similar to Excel's built-in function MMULT but it treats empty cells and non-numerical cells (strings) as zero.

Arguments:

input_A – a two-dimensional range of cell elements or an input array

input_B – a two-dimensional range of cell elements or an input array. Number of rows of input_B has to be equal to number of columns of input_A

Result:

A two-dimensional matrix with numerical values. Same number of rows as input_A and same number of columns as input_B

Error values:

Number of columns of matrix A must equal number of rows of matrix B! – [self-explanatory, isn't it?]

Examples:

	A	B	C	D	E
1	1	2		No	6
2	3	4	Yes	7	8
3	1	0	1	2	6
4	4	3		1.1	2.2
5	3	2	0.1	FALSE	TRUE

=sbMmult(A1:B2,D1:E2) will return {14,22;28,50}

=sbMmult(A1:C3,C3:E5) will return {1,4.2,10.4;3,10.4,26.8;1.1,2,6}

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2.5 sbNRN(input , max_denominator, [max_absolute_error])

sbNRN returns the nearest rational number to the input number with the maximal denominator max_denominator and with the maximal absolute error max_absolute_error. If the maximal absolute error is not provided it will be set to $\frac{1}{2 \max_denominator^2}$.

Arguments:

input – a numerical value of type double

max_denominator – a numerical value of type long

[optional] max_absolute_error – a numerical value of type double. Provide this error threshold if you need to ensure that the resulting fraction does not differ too much from the input value

Result:

A vertical matrix {nominator;denominator}

Error values:

Absolute error of solution exceeds 1/(2 * maxDenominator^2) – This error message indicates that the algorithm cannot find the nearest rational number with the given input parameters. Please notice that you could always try to rerun the calculation with a higher maximal denominator or with a higher maximal absolute error.

Examples:

=sbNRN(1.1,9,0) will return “Absolute error of solution exceeds 1/(2 * maxDenominator^2)”

=sbNRN(1.1,9,0.02) will return the vertical array {10;9}

=sbNRN(Pi(),10,-1) will return {22;7}

=sbNRN(Pi(),1000,-1) will return {355;113} [A good proxy for π]

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2.6 sbNSig(input, digits)

sbNSig returns the digits significant digits of the input.

Arguments:

input – a number of type double

digits – a positive integer

Result:

A number of type double

Examples:

= sbNSig (Pi(),3) will return 3.14

= sbNSig (Pi(),4) will return 3.142

= sbNSig (1234,-2) will return 1200

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2.7 sbReverse(input)

sbReverse returns the inverted input string, last character first, last but one character second, and so on until first character last.

Arguments:

input – a string

Result:

A string

Examples:

= sbReverse (“abc”) will return “cba”

= sbReverse (“normal”) will return “lamron”

= sbReverse (“A1B2C3”) will return “3C2B1A”

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2.8 sbSplit(input , [delimiter] , [skip_empty])

sbSplit splits the delimiter separated parts of the input string into an array. Empty parts (consecutive delimiters) will be ignored if skip_empty is True.

Arguments:

input – a string

[optional] delimiter – string which will delimit the parts of the input string. Preset by “,”.

[optional] skip_empty – TRUE: consecutive delimiters will be treated as one
FALSE: consecutive delimiters will create empty return array elements

Result:

An array

Examples:

=sbSplit (“a,b,c”) will return {“a”;“b”;“c”}

=sbSplit (“1,2,3,,,”) will return {1;2;3;[empty cell]}

=sbSplit (“1,2,3,,,”,True) will return {1;2;3}

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2.9 sbVector(count , [is_horizontal] , [start] , [inc])

sbVector creates a vector constant with count cells, starting with value start and incremented by inc. If is_horizontal is TRUE the vector will be horizontal, or vertical otherwise. This function is intended to replace the old but inefficient (volatile) worksheet function “trick” =ROW(INDIRECT(“1:3”)) by the non-volatile sbVector(3), for example.

Arguments:

count – count of elements

[optional] is_horizontal – boolean value: FALSE (the default) will create a vertical vector, TRUE will create a horizontal one

[optional] start – start value, default value is 1.0

[optional] inc – incremental value, default value is 1.0

Result:

Array (vector) constant

Examples:

=sbVector(3,TRUE,5) will create {5,6,7}

=sbVector(4) will create {1;2;3;4}

=sbVector(5,TRUE,-0.1,0.2) will create {-0.1,0.1,0.3,0.5,0.7}

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2.10 sbVersion()

sbVersion returns a version string for the Sulprobil Excel © add-in which shows the date and time of its creation, the version number of the XLW wrapper and the Boost version number.

Arguments:

none

Result:

String

Examples:

=sbVersion() will return "Sulprobil version: Jan 20 2010, 19:45:27, xlw-4.0.0f0, boost_1_40", for example

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2.11 sbWAvg(values, weights, [count_empty])

sbWAvg calculates the weighted average $\sum \text{values} * \text{weights} / \sum \text{weights}$. If count_empty is True empty cells will be counted, i.e. their weights will be added to the denominator.

Arguments:

values – a two-dimensional range of cell elements or an input array

weights – a two-dimensional range of cell elements or an input array. Array values and array weights have to have identical shape, i.e. they have to have the same number of rows and the same number of columns.

Result:

A number of type double

Error values:

Input values and input weights have to have same number of rows and columns! – [self-explanatory, isn't it?]

Sum of weights is zero! – [self-explanatory, isn't it?]

Examples:

	A	B
1	1	2
2	3	1
3	5	1
4		1

=sbWAvg(A1:A3,B1:B3,False) will return $(1*2 + 3*1 + 5*1) / (2+1+1) = 2.5$

=sbWAvg(A1:A3,B1:B3,True) will return $(1*2 + 3*1 + 5*1 + 0*1) / (2+1+1+1) = 2$

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2.12 sbWCount(input, delimiter)

sbWCount counts the number of words in the input string delimited by delimiter. This is the number of occurrences of the delimiter plus one.

Arguments:

input – a string

delimiter – string which will delimit the parts of the input string. Preset by “,”.

Result:

A number

Examples:

=sbWCount(“a,b,c”,“,”) will return 3

=sbWCount(“;;;”,“;”) will return 5

=sbWCount(“two words”,“ ”) will return 2

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2.13 sbWeeknum(input)

sbWeeknum returns the ISO week number of an input date. An ISO week starts on Monday and ends on Sunday. The first week of a year is

- the week with the year's first Thursday in it (the formal ISO definition), or
- the week with 4 January in it, or
- the first week with the majority (four or more) of its days in the starting year, or
- the week starting with the Monday in the period 29 December – 4 January

Arguments:

input – A date, 1-Jan-1900 or later.

Result:

An integer number

Error values:

Input needs to be greater equal zero! – [self-explanatory, isn't it?]

Input needs to be a number greater equal zero! – If the input is not a number

Example:

=sbWeeknum(DATE(2010,2,28)) will return 8