**How to use the “interpolate” transform function**

*With an example to interpolate data in a graph.*

The “interpolate” transform function creates interpolated y values for an xy data table.

For each “new x value” in range, the corresponding new y value is interpolated from the position of this new x value in the original x column.

New x =1,5 is in the middle between old x = 1 and old x = 2.
The middle of the corresponding old y values (1 and 4) is 2,5.
New y (x = 1,5) = 2,5

<table>
<thead>
<tr>
<th></th>
<th>1-x_range</th>
<th>2-x</th>
<th>3-y</th>
<th>4-interpolated_y</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0,0000</td>
<td></td>
<td></td>
<td>0,0000</td>
</tr>
<tr>
<td>1</td>
<td>0,5000</td>
<td>1,000</td>
<td>1,000</td>
<td>0,5000</td>
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<tr>
<td>2</td>
<td>1,0000</td>
<td>2,0000</td>
<td>4,0000</td>
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<td>3</td>
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<td>6</td>
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</tbody>
</table>

**interpolate**
The interpolate function performs linear interpolation on a set of X,Y pairs defined by an x range and a y range. The function returns a range of interpolated y values from a range of values between the minimum and maximum of the x range.

**Syntax**

`interpolate(x range; y range; range)`

Values in the x range argument must be strictly increasing or strictly decreasing.

The range argument must be a single range (indicated with the `{ }` brackets) or a worksheet column. Missing values and text strings are not allowed in the x range and y range. Text strings in range are replaced by missing values.

Extrapolation is not possible; missing value symbols are returned for range argument values less than the lowest x range value or greater than the highest x range value.

**Example**

For x = {0;1;2}, y = {0;1;4}, and range = data(0; 2; 0,5) (this data operation returns numbers from 0 to 2 at increments of 0,5), the operation col(1) = interpolate(x; y; range) places the range {0,0; 0,5; 1,0; 2,5; 4,0} into column 1.

If range had included values outside the range for x, missing values would have been returned for those out-of-range values.
x = {0; 1; 2}
y = {0; 1; 4}
x_range = data(0; 2; 0,5)
interpolated_y = interpolate(x; y; x_range)

col(1) = x_range
col(2) = x
col(3) = y
col(4) = interpolated_y
cell(1;0) = "x_range"
cell(2;0) = "x"
cell(3;0) = "y"
cell(4;0) = "interpolated_y"

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Interpolating Graph Data

This graph shows two XY pair plots, a (red) line/scatter plot with X intervals of 10, and a (blue) line plot with X intervals of 0.3. To calculate the Y difference of both curves at the X values of the red plot, you need the Y values of the blue curve at the "red" X values. Use the interpolate function to calculate them.

Run this transform (On the worksheet, press F10, paste the lines into the edit window with Ctrl-V, and click on Run):

\[
\text{Xred} = \text{col}(1) \\
\text{Xblue} = \text{col}(3) \\
\text{Yblue} = \text{col}(4) \\
\text{interpolated}_y = \text{interpolate}(\text{Xblue}; \text{Yblue}; \text{Xred}) \\
\text{col}(5) = \text{interpolated}_y
\]
**Note:**
Use of list separator (; or ,) and decimal sign (, or .) in a transform. This depends on your Windows Control Panel settings for: Region and Language > Formats > Additional settings > Numbers.

Valid combinations are:
- Semicolon and comma: list separator (;) and decimal sign (,)
- Comma and point: list separator (,) and decimal sign (.)

Details:
[http://www.systat.de/TT201205/DecimalsignSigmaPlot.pdf](http://www.systat.de/TT201205/DecimalsignSigmaPlot.pdf)

Now add a scatter plot with the new Y data: Graph Page > Add Plot.

**Three XY pair plots in one graph**

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**P.S.: Sample data**
To use the sample data from this example, run these lines in a transform:

```
col(1) = data(20; 140; 10)
col(2) = {44, 4; 45, 2; 47, 6; 54, 3; 71, 5; 104, 9; 140, 7; 155, 7; 157, 9; 158, 0;
          158, 0; 157, 9; 158, 1}

col(3) = data(10; 150; 0, 3)
x = col(3)
y = 0.25 * x + 10
col(4) = y
```