

Usage of Interpolation Macros

Since Excel doesn't allow simple help fields when coding a macro in VBA it is sometimes confusing as to how to use someone else's macro. Let's try this as an explanation...

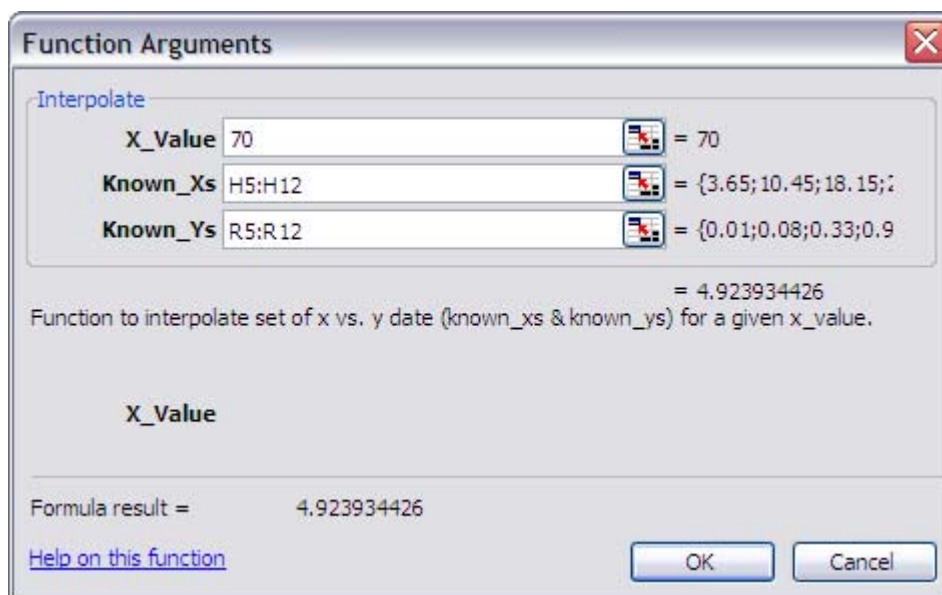
Linear Interpolation

Given a set of x vs y data, the linear interpolation routine, Interpolate, will find an appropriate value of y_i given a value of x_i . The routine will determine if x_i is in between any of the x data values. If it is, then linear interpolation is performed to find the value of y_i . If it is before the first x value, then the y_i value is determined by extrapolation of the first two points; if it is after the last x value, then the y_i value is determined by extrapolation of the last two points.

The following shows part of a spreadsheet. We're interested in determining the sulfur content of a narrow fraction whose cumulative yield at the middle of the increment is 70 vol%. We will associate the yield data in cells H5:H12 with the sulfur data in cells R5:R12.

Ratawi Crude Oil											
	TBP (°F)			Yield (vol%)				Gravity			
	Initial	Final	@ Mid Vol% Cumulative Yield	Cumulative @ Initial	Cumulative @ Final	Cumulative @ Mid	Increment		Calculated Specific Gravity	Sulfur Content (wt%)	
4	Whole Crude								24.5	0.9071	3.88
5	Light Naphtha	55	175	129.0	1.7	5.6	3.65	3.9	82.9	0.6600	0.0
6	Medium Naphtha	175	300	248.6	5.6	15.3	10.45	9.7	57.0	0.7507	0.1
7	Heavy Naphtha	300	400	352.5	15.3	21	18.15	5.7	49.3	0.7828	0.3
8	Kero	400	500	452.2	21	29.2	25.10	8.2	41.4	0.8184	1.0
9	Atm Gas Oil	500	650	577.2	29.2	40.4	34.80	11.2	33.2	0.8591	2.4
10	Light VGO	650	850	750.3	40.4	57.3	48.85	16.9	22.1	0.9212	3.5
11	Heavy VGO	850	1050	946.4	57.3	71.5	64.40	14.2	15.7	0.9613	4.2
12	Vacuum Resid	1050	End	1311.0	71.5	100	85.75	28.5	3.5	1.0481	7.0
13	Atm Resid	650	End	1030.3	40.4	100	70.20	59.6	11.2	0.9916	5.4

Using the Insert Function menu command will ultimately bring up the dialogue box shown as follows. In this case the value "70" is specified (giving an answer of 4.9). A cell reference could also be specified.



Distillation Interpolation

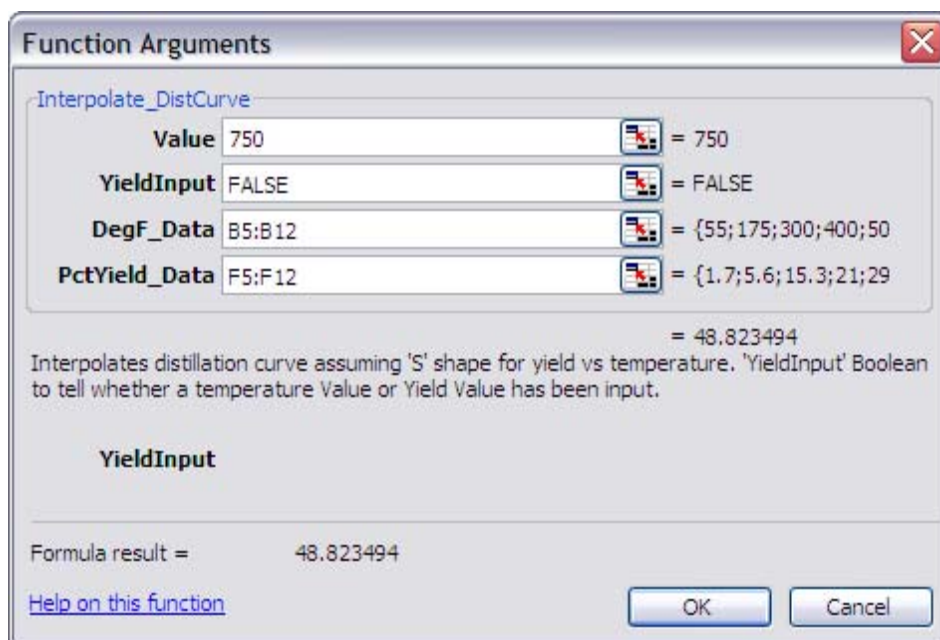
Distillation data (yield vs temperature) should be interpolated/extrapolated in such a way as to guarantee a "S" shaped curve. This is ensured in the Interpolate_DistCurve routine by transforming the yield data using the NORMSDIST & NORMSINV routines and then performing linear interpolation/extrapolation on the transformed data.

This routine should only be used for yield vs temperature and is not appropriate for working with other types of data sets.

You'll be starting with a given set of corresponding temperature & yield values from which you want to extract a new value. The block of cells that designate the given temperature values will be passed into the macro as the variable "degF_Data". The block of cells that designate the given cumulative yield data will be passed into the macros as the variable "pctYield_Data"; these values are to be scaled from 0 to 100.

You will be calling the macro to either estimate a yield from a temperature value or a temperature from a yield value. Both of these calculations can be done using the same macro. If you input a temperature value to calculate a yield, associate the cell with the temperature value as "Value" & let "YieldInput" be FALSE (since you did not input a yield value); the macro will interpret Value as a temperature (in °F) & return a cumulative yield. If you input a yield value to calculate a temperature, associate the cell with the yield value as "Value" & let "YieldInput" be TRUE (since you did input a yield value); the macro will interpret Value as a yield (in %, 0 to 100) & return a temperature (in °F).

In the example above, the degF_Data values are in cells B5:B12 and the pctYield_Data" are in F5:F12. The following shows the dialogue box to determine the yield at 750°F; note that the result is 48.8 vol%.



The following shows the dialogue box to determine the temperature corresponding to a 50 vol% yield; note that the result is at 763.8°F.

