### Office

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# Question

JT2012XXX asked on May 14, 2012 •

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### How can I add in a hyperbolic regression curve in Excel 2010?

Original Title: "hyperbolic curve"

In addition to Linear, Polynomial selections in Excel - we would like the option to add-in a Hyperbolic regression curve.

Is there a Template that exists with this option? or other instructions welcome!

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E.J. GUN replied on May 14, 2012 •



A hyperbolic curve of the form  $y=(m^*x)/(k+x)$  has a discontinuity at x=-k. This prevents a "traditional" curve fitting of the entire curve, but you can easily fit the curve if you transform the equation into a linear version, solve for the linearized coefficients, and then use those coefficients to fit the non-linear data. Steps to take:

- 1. Instead of fitting  $y=(m^*x)/(k+x)$ , you will transform the equation into  $(1/y)=(1/m)+(k/m)^*(1/x)$ .
- 2. Now you have two new coefficients, A = (1/m) and B = (k/m), and two new variables (1/y) and (1/x)
- 3. The new equation becomes (1/y) = A + B\*(1/x). You can run a linear regression on this equation, using the(x,y) set of data you are trying to fit, to solve for the coefficients A and B.
- 4. Once you have A and B, you can solve for m and k: m = 1/Ak = m\*B
- 5. Use the coefficients m and k to calculate the fitted curve.

You have to watch for and handle discontinuities (x = 0, y = 0, x = k, etc).

нтн,

Eric

P.S. - this can all be done with equations on a worksheet, or with VBA

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# Answer

Gary's Student replied on May 14, 2012 ▼

MVP 🜟 Community Star

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While not a template, here is an example of GUN's solution. Say the x values are in colum A (A1 thru A10) and the y values are in column B (B1 thru B10):

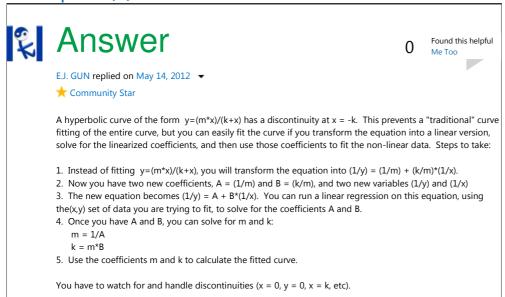
- 1 0.500000
- 2 0.933333
- 3 1.312500
- 4 1.647059
- 5 1.944444

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```
In C1 enter:
=1/A1 and copy down
In D1 enter:
=1/B1 and copy down
Cols C & D display:
1.000000 2.000000
0.500000 1.071429
0.333333 0.761905
0.250000 0.607143
0.200000\,0.514286
0.166667.0.452381
0.142857 0.408163
0.125000 0.375000
0.111111 0.349206
0.100000 0.328571
To do a linear fit to cols C & D, in E1 enter:
=SLOPE(D1:D10,C1:C10)
In E2 enter:
=INTERCEPT(D1:D10,C1:C10)
This displays:
1.857143
0.142857
Finally to calculate m and k, in F1 enter:
=1/F2
and in F2 enter:
=F1*E1
F1 and F2 display
13
The fit is then
y=(7*x)/(13+x)
GSNU201305
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```

## All Replies (2)

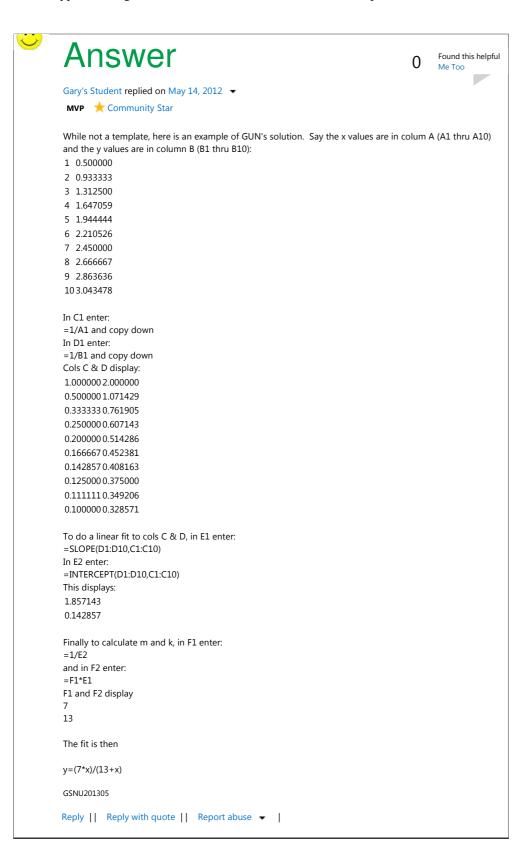
HTH, Eric



P.S. - this can all be done with equations on a worksheet, or with VBA

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