
Subject: Re: help with mathematics

Posted by [Russell Ryan](#) on Tue, 29 May 2012 04:02:06 GMT

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On May 28, 10:46 am, nata <bernat.puigdomen...@gmail.com> wrote:

> Hi All,

>

> I have a set of measurements, X and Y, and I need to fit a polynomial function with the following "constraints":

>

> $Y = a + bX + CX^2 + ((1-b-4C)/12)X^3$

>

> I tried to do this with the AMOEBA function but the result is not consistent at all. You can see my code below...

>

> I need some help with this problem. Could anyone help me with this problem ?

> Thank you in advance

>

> nata

>

> ; First define the function FUNC:

> FUNCTION FUNC P

> COMMON FUNC_XY, X, Y

> RETURN, MAX(ABS(Y - (P[0] + P[1]*X + P[2]*X^2 + ((1-P[1]-4*P[2]) / 12)*X^3)))

> END

>

> PRO PROGRAM

>

> COMMON FUNC_XY, X, Y

> X=[11.0,13.0,14.5,15.5,16.5,17.5,18.5,19.5,20.5,21.5,22.5,23.5,24.5,25.5, \$

> 26.5,27.5,28.5,29.5,30.5,31.5,32.5,33.5,34.5,35.5,37.0,39.0, 41.5,44.5,48.0]

>

> Y=[-0.921,-0.735,-0.627,-0.554,-0.439,-0.379,-0.313,-0.247,- 0.186,-0.126, \$

> -0.092,-0.018,0.052,0.108,0.185,0.255,0.308,0.375,0.443,0.525,0.597,0.656, \$

> 0.733,0.816,0.950,1.109,1.269,1.562,2.044]

>

> R = AMOEBA(1.0e-25, SCALE=[1e2,1e2,1e2], P0=[0,0,0], FUNCTION_VALUE=fval,
FUNCTION_NAME='FUNC')

>

> PLOT, X, Y

> OPLOT, X, (R[0] + R[1]*X + R[2]*X^2. + ((1-R[1]-4*R[2])/12)*X^3.), COLOR=222

>

> END

Wait, you're not making any sense. Are you saying that you have two vectors (x and y) to which you want to fit a function of the form:

$y_{\text{model}} = a + bX + CX^2 + ((1-b-4C)/12)X^3$

and determine the coefficients a, b, c? If so, then there are a dozen ways to do this and amoeba is among the worst. Not to mention, your definition of the minimization function (while what IDL suggests) is not very good, because it's not differentiable. Always minimize a distance metric of the form

$$X^2 = \sum_i (y_i - y_{\text{model}}(x_i))^2$$

where i runs over points --- unless you have a very good reason *NOT* to do this.. This way, you can take the derivative of X^2 w.r.t. each parameter, set them to zero, and solve the resulting set of equations. If the problem is linear (and this one is), then you can solve the problem exactly by inverting a simple matrix.

Please look into curvefit.pro (comes with IDL) or mpfit.pro (built and maintained by C. Markwardt).

Russell
