

Week 1: Error Propagation and Using Excel's "Solver"

Name: _____

time (ms)	position (mm)
0.0	130
0.1	140
0.2	149
0.3	158
0.4	167
0.5	175
0.6	183
0.7	191
0.8	198
0.9	205
1.0	209
1.1	215
1.2	219
1.3	222
1.4	225
1.5	226
1.6	226
1.7	227
1.8	227
1.9	227
2.0	228

Installing/activating Solver in MS Office 2007:

1. Click the colored round "Office" button
2. Go to "Excel Options" at the bottom.
3. Choose "Add-Ins", then wait a moment.
4. Click the GO button at the bottom.
5. Select the "Solver" add in (and any others you want).

Finding and Using Solver after it has been activated:

Choose the "Data" menu; solver is now way over on the right side.

Assignment

1. Enter this data set
2. Plot it. Have labels as appropriate. Note that measured data point should have dots/markers but NO connecting lines.
3. Use Solver to find the equation of the best fit line for this data: $x = b + mt$
4. Then find the best fit parabola: $x = a_0 + a_1t + a_2t^2$
5. Then find the best fit exponential: $x = C_1 + Ae^{kt}$
6. Then find the best fit sine wave: $x = C_2 + B\sin(\omega t)$. For this case, you probably need reasonably good starting guesses.
7. Report your results below for the various constants you've found. Use 3 sig-figs for each. Hint: most of these constants are numbers *with units*. Excel only tells you the number part, but you must tell me both.
8. All of these fits were found using the method of least squares. Which of these four fitting methods gave the "best" results? How do you know?
9. Add the best of these fits to your plot (consisting of a line without markers), and attach it to this sheet.

Constants:

$b =$ $m =$	$a_0 =$ $a_1 =$ $a_2 =$	$C_1 =$ $A =$ $k =$
$C_2 =$ $B =$ $\omega =$		

Which is best? _____

How do you know? _____
