Engin 103		Topics:				
March 1, 2011		CW4 (part b)				
		Logbook questions				
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CW4 (Part b i)						
b) Download this data set, repeat the	b) Download this data set, repeat the table above for this new data set; (i) In Sheet#2 using					
all terms in each polynomial model	. Insert sprea	adsheet snapshots, p	olynomial coefficients,			
and parameter s into Table 2 in your MS Word file (ii) In Sheet #3 using only the highest						
order term in each polynomial model. Insert spreadsheet snapshots, polynomial coefficients,						
and parameter s into Table 3 in your MS Word file. Can you conclude what is the dominant						
relationship (linear, quadratic, or cubic) between the periods and the lengths of a pendulum?						
Model (all terms)	Coefficients		S parameter			
	A=					
	B=					
	C=					
	D=					
Linear						
	A=					
	B=					
	C=					
	D=					
Quadratic						
	A=					
	B=					
	C=					
	D=					
Cubic						
Table 2: All terms in polynomials models using new data set						
Model (only leading terms)	Coefficients		S parameter			
The second secon	A=					
1 5 10000 </td <td>B=</td> <td></td> <td></td>	B=					
	C=					
	D=					
Linear						



Q&A

1) I have copied Sheet#1 to Sheet #2, cleared contents in cells A9-B47 and pasted in the new data set in columns A and B. Do I need to change anything in column C and cell D3?

No, we are going to try the same cubic, quadratic and linear models on the new data set. So the formula will be the same in D3 and there should still be guess values in C3 through C6, although some of them will be zero depending on the particular model we will be using. 2) Do I need to change anything in column D?

Yes, since in Sheet#1 you worked with only 4 pairs of data. Now we have 42 pairs of data, so copy cell D6 to D7-D44.

3) Any change in column E?

Yes, same as with column D: copy cell E6 to E7-E44.

4) When I click on F3, the "s parameter", the formula was "=average(E3:E6)", do I need to change anything here?

Yes, since we now have 42 pairs of data, we need to average over 42 deviations between Y' (model) and Y (data): change the formula to "=average(E3:E44)". Notice that these cell numbers refer to the instructor's example, that is, when the first row of numbers is row #3.



5) Am I now ready to copy the polynomial coefficients and the s parameter to the table?

Not yet. Any time you make a change to the data or the model, you need to repeat the s parameter minimization using Solver to obtain a new model.

6) Why my graph does not change after I use Solver?

Since we copied Sheet#1 to Sheet#2, the series in the graph are still referred to Sheet#1. In Sheet#2, right click inside the graph, select "Source Data", click on "Series", then make sure you have the right Series1 and Series2 as shown in the figures below. Notice the X and Y values for Series1 (data) correspond to columns A and B, respectively, and those for Series2 (calculated from the model or equation) correspond to columns A and D, respectively.



7) How do I get the different models without changing the formula in cell D3?

If you already have a cubic formula in D3-D44, you can get the cubic, quadratic, and linear models by allowing Solver to change C3:C6, C3:C5, C3:C5, C3:C5, content cubic that at the same time, in Sheet#2 to obtain the quadratic model, cell C6 (carrying the cubic coefficient D) should contain a 0, and for the linear model both cells C3 (carrying the quadratic coefficient A) and C6 (carrying the cubic coefficient D) should contain a 0.

CW4 (Part b ii)		
b) (ii) In Sheet #3 using only the high	est orde	r term in each model
Model (only leading terms) Co	pefficient	ts S parameter
	A= B= C= D=	
Quadratic	A= B= C= D=	
Cubic	A= B= C= D=	
Q&A 1) After copying Sheet#2 to Sheet#3, do Yes, nn Sheet#3, right click insid make sure the X and Y values for each so Source Data	I need to le the gra eries refe ?X	check the two series in the graph? ph, select "Source Data" click on "Series", and r to Sheet3, see figures below.
Data Range Series		Data Range Series
25.00 20.00 5.00	Series Series	25.00 20.00 15.00 5.00 0.0
Series1 Name: Series2 ⊻ Values: Y Values: =Shaet31\$A\$3:\$A\$44 Y Values: =Shaet31\$B\$3:\$B\$44	N	Series Name: Series2 ⊻ Values: =Shae(3)\$A\$3:\$A\$44 ✓ ⊻ Values: =Shae(3)\$D\$3:\$D\$44 ✓ ⊻ Values: =Shae(3)\$D\$3:\$D\$44

2) How do I get the different models with only the leading terms without changing the formula in cell D3?

If you already have a cubic formula in D3-D44, you can get the cubic, quadratic, and linear models using only the leading terms by allowing Solver to change \$C\$6, \$C\$3, or \$C\$4,



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LOGBOOK: example of a logbook page			
-Use a quadrille notebook; number all pages; date all entries			
-Write your notes for all activities, thoughts, problems and solutions, and learning			
conclusions related to Engin 103. You should write down progress, outcomes, and			
conclusions on projects and teamwork: conclusions from class work (including			
LabUIEW) and homework			
Lad v IE w) and nonework.			
-In addition you should answer in the logbook all questions listed in these notes in blue, as			
shown below:			

19) Insert copies of the Tables 1, 2, 3 into your logbook.

(a) Did you expect to get the same coefficients A, B, C, D and the s parameter for these two sets of data? Notice that the initial four pairs of data are contained in the longer data set. Explain why Tables 1 and 2 contain different results.

(b) After looking at Tables 2 and 3 can you conclude that for any set of data, the higher the order of the polynomial model (e.g. in this case, the cubic model), the better the model (as reflected in the final s parameter achieved)? Explain why.

(c) Looking at Tables 2 and 3, which one would be preferred by a scientist, which by an engineer? How would you characterize each table in one word?

20) Write a quadric (fourth order) polynomial in a similar format as we wrote the cubic polynomial in the previous class note. Explain in your own words what are the changes you will need to do to in the Excel spreadsheet you made for a cubic model to produce a quadric model.

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