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Project 1 Progress Report

General comments:
Project 1: System predictability

Design will affect predictability:

1.-Good design leads to distinctive and consistent data that can be measured. Good data allows the construction of a good mathematical model.

2.-Good design reduces to a minimum any possible uncertainty in the system

3.-Simple design allows better control of the input and output variables.

Team #	a)Describe what system your team is building b) What are the input and output in that system	c) In what units (cm, in, s, etc.) will your team be measuring the input and output, d) what instruments are you using to make the measurements (rulers, stop watch, etc.) e) list the **distinctive values** you can get for the input in increasing order	Assign a grade on communication in your team in this project: 4 –members always communicate how they are doing on their part 3 – members sometimes communicate how they are doing on their part 2- some member does not reply emails or phone calls 1 – members show no interest in participating
1	a) Ramp& marble system, having a marble roll off a ramp and project its landing path. b) The input would be the marble's starting point on the ramp and output will be where it lands.	c) cm (metric system) d) ruler/meter stick and stop watch. e) Mass of marble, height/slope, velocity.	4 – our team works well together and comes up with brilliant ideas, concepts, and strategies
2			
3	(a) ball ramp (b) input: height, output: distance traveled (in cm)	c) cm (d) tape measure, protractor (e) 5, 10, 15, 20, 25, 30, 35, 40, 45, 50	Teamwork grade : 4
4	a) We are building a pendulum. b) The input, or x-value, will be the height the pendulum will be dropped	c) it will be measured in inches d) we are going to use a ruler to measure the heights e) 10 inches, 11 inches,	4

	from. The output, or y-value, will be the height the pendulum as it approaches the original spot it was dropped from.	12 inches *It will be difficult to measure precisely the height since the bob is moving and the stop position needs to be determined. Also the variation in the heights will be small, which may be masked by the low precision measurements.	
5	A.) Roller Coaster B.) Input:Starting position, Output:End position	C.) cm D.) Rulers/tape measure E.) 1-10 cm *How will you measure the end position when the marble falls off the loop?	4
6	a) A ramp with an edge that varies in angles. When a ball is dropped off the top, how far does the ball travel after leaving the ramp based on the angle. b) The input is the angle of the end of the ramp. The output is the distance the ball travels based on the angle. *This is a very good definition of the input and output variables X and Y	c) We will be measuring using the metric system. (meters and centimeters). d) We will several ramps, protractors, a ball, a ruler **e)** We will use typical angle measurements such as 0 degrees, 30 degrees, 45 degrees, 60 degrees, 75 degrees and 90 degrees.	2
7			
8	a) Pulley System b) Input is weight object, Output is Force needed to lift weight.	c)Grams d)Spring Scale e) X (in increasing order) =100g, 150g, 200g, 250g, 300g, 350g, 400g, 450g, 500g	4
9	a. Our team will be building a system with two fulcrums. It will be containing one fulcrum with a weighted object with height release adjustments. The second fulcrum will contain a see-saw like function. The 1st	c. The measurement system of our project will be measured in centimeters(cm) d. We will be using a ruler as our measurement instrument e. The distinctive value we can get for the input will increase	2-Some members does not reply emails or phone calls

	fulcrum will strike the second, launching a ball that will be measured for height. b. The input is the height release of fulcrum one, and the output is the height of the ball after being launched from fulcrum two.	from 4 centimeters up, increasing by 2 centimeters each increment. *Pay attention on how to measure the height of the ball after it got launched. Good data will lead to a good model to check system predictability, inconsistent data will not help obtaining a good mathematical model.	
10	a) a ramp with a small hole ½ way though – we are going to determine what angle the ramp has to be raised to in order for a marble to fall through the hole. b) Input: angle height, output: speed of marble	c) input – degrees, output – m/s d) ruler, protractor, stop watch e) 30, 45, 60, 75 degrees *Will you be able to make distinctive values for the ramp angle? A small angle increase will make the marble go a long way.	3

Reminders

Due today:

Individual Logbooks: progress in class, teamwork, answers to 14 logbook questions

Due 10/9:

Project 1 system

Due 10/14:

Project 1 system along with spreadsheets with polynomial models for system

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CW4 (Part b)

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 spreadsheet snapshots, polynomial 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?

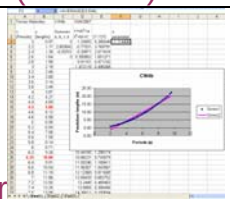
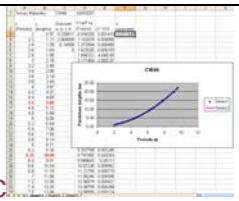
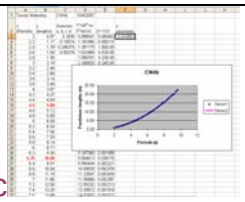
Model (all terms)	Coefficients	S parameter
Linear 	A= B= C= D=	
Quadratic 	A= B= C= D=	
Cubic 	A= B= C= D=	

Table 2: All terms in polynomials models using new data set

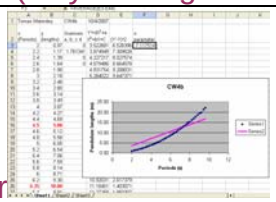
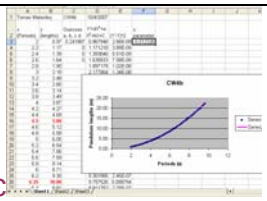
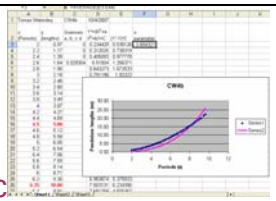
Model (only leading terms)	Coefficients	S parameter
Linear 	A= B= C= D=	
Quadratic 	A= B= C= D=	
Cubic 	A= B= C= D=	

Table 3: Only highest order term in polynomial models using new data set

In each team, students working together at a computer numbered between 1 and 10 will submit file cw4_XX_a.html and folder cw4_XX_a_files, students working at a computer numbered between 11 and 20 will submit file cw4_XX_b.html and folder cw4_XX_b_files, to the *files* folder in the server. Replace XX by 01 if team 1, etc.

Include your names within the files.

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?

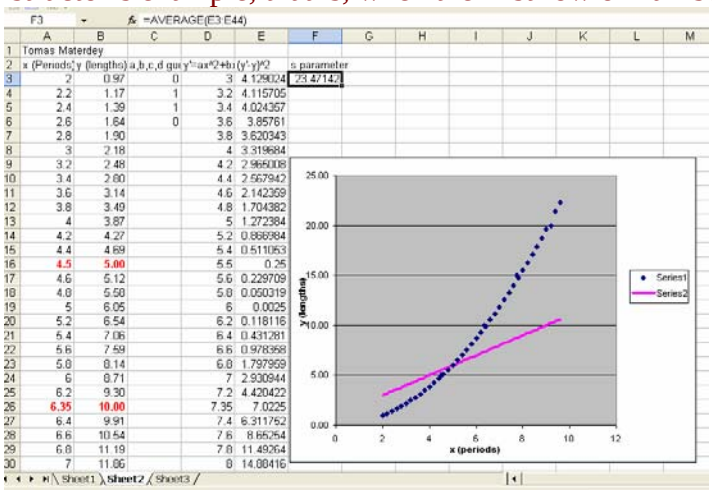
Yes, since in Sheet#1 you worked with only 4 pairs of data. Now we have 42 pairs of data, so copy cell D6 to D7-D44.

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.

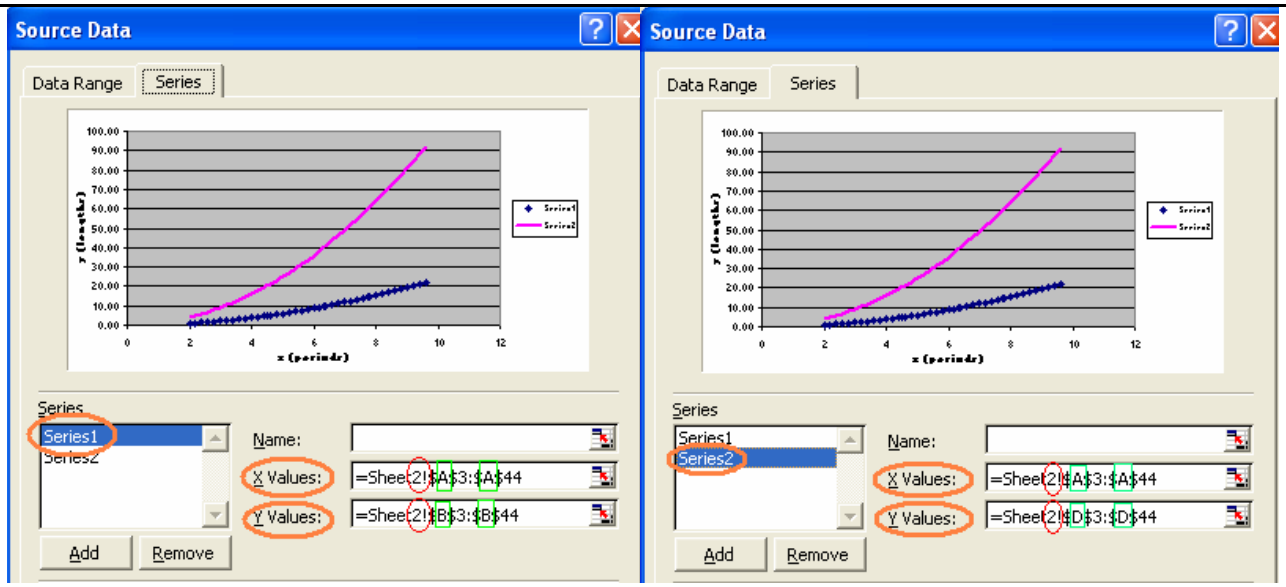


5) Am I now ready to copy the polynomial coefficients and the s parameter to the table?

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 $C$3:$C$6, $C$3:$C$5, $C$4:$C$5, respectively. Notice 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.

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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 LabVIEW) and homework.
-In addition you should answer in the logbook all questions listed in these notes in blue, as shown below:

15) 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.

16) 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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