HW 12

ENED 1090: MODELS I
Week 12 Homework

Submit Week 13 during Lab

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INSTRUCTIONS

Complete each question below by typing your answer or copying from the output in MATLAB or Excel.

This assignment is to be completed outside of class. You will submit a digital copy to your TA during the lab session next week.

!!! **To receive points for this assignment, add your name to the filename. For example, if my name is Lin Yali, I will change the filename to**

Wk12_ened1090_homework_LinYali.doc

OBJECTIVES

For this assignment, students will demonstrate

- Curve Fit Options

PROBLEM 1 (SEE SLIDE 6)

Here is some data.

TIME (T)	0.5	1	2	3	4	5	6	7	9
POPULATION (P)	6	4.4	3.2	2.7	2	1.9	1.7	1.4	1.1

Calculate the average value and the residual (Rs) of the data using scratch paper (and a calculator) Include an image of your written work if possible.

Time (t)	0.5	1	2	3	4	5	6	7	9		Yaverage
Population (P)	6	4.4	3.2	2.7	2	1.9	1.7	1.4	1.1		2.711111111
difference	3.288889	1.68888889	0.488889	-0.01111	-0.71111	-0.81111	-1.01111	-1.31111	-1.61111		Rs
square	10.81679	2.85234568	0.239012	0.000123	0.505679	0.657901	1.022346	1.719012	2.595679		20.40888889

PROBLEM 2 (SEE SLIDE 9)

Hint: use the techniques you have learned in algebra to find the equation of a line (slope and intercept) from two points.

For the data in problem 1, use the values at T = 0.5 and T = 9 to determine a linear curve fit. Include an image of your written work if possible.

option1	
m	-0.57647
b	6.288235

option1	
m	=($J$2-$B$2)/($J$1-
b	=$J$2-$B$8*$J$1

Repeat the exercise, but use the values at T = 3 and T = 4. Include an image of your written work if possible.

option2	
m	-0.7
b	4.8

option2	
m	=($F$2-$E$2)/($F$1-
b	=$F$2-$D$8*$F$1

PROBLEM 3 (SEE SLIDE 6-9)

Using the results from problem 2, calculate the residuals Rf for both of the equations. Include an image of your written work if possible.

Rf1
17.12179931

Rf1
=SUM(B13:J13)

Rf2
13.1125

Rf2
=SUM(B20:J20)

Then, calculate the R-value and decide which curve is a better fit to the data. Include an image of your written work if possible.

R1
0.161061663

R1
=ABS($L$5-$L$13)/$L$5

R2
0.305761625

R2
=ABS($L$20-$L$13)/$L$20

Option 2 is better fit to the data.

PROBLEM 4 (SEE SLIDE 13, 18-19)

Describe the two-stage process for finding a polynomial curve fit in MATLAB using a script

```
T=[0.5  1   2   3   4   5   6   7   9];
P=[6    4.4 3.2 2.7 2   1.9 1.7 1.4 1.1];
plot(T,P,'rs','markerFaceColor','k')
hold on
m=-0.57647;
b=6.28824;
Ylin=polyval([m b],T);
plot(T,Ylin,'-b')
A = polyfit(T,P,4);
Tbig=linspace(min(T),max(T),50);
Y1lin=polyval(A,Tbig);
plot(Tbig,Y1lin,'rs')
```

PROBLEM 5 (SEE SLIDE 21-22)

- Create a complicated equation of your own that could be used in the SWAK_CurveFitReg.m file, but could not be used in Excel or in MATLAB (using the graphical or polynomial fit methods).
- Also, provide the appropriate number of guess values to the A's

```
SWAK = @(A,x) A(1)*sin(A(2)*x+A(3))+A(4)*exp(A(5)*x);
```