Regression Video Lecture

Sections 3.4, 4.1, 5.9

Course Learning Objectives:
Graph functions and use such graphs to solve applied problems and to understand the significance of attributes of the graph to such applied problems.

Weekly Learning Objectives:
1) Use tables on a graphing utility.
2) Use a graphing utility to create a scatterplot from data.
3) Use a graphing utility to find and plot a regression line.
4) Use a graphing utility to find regression curves.

Regression

Pressure at Various Ocean Depths

Depth (ft)	Pressure (lb/in^3)
5	15.5
8	20.3
12	20.7
15	20.8
18	23.2
22	23.8
25	24.9
30	29.3

1) Make a scatterplot of the data

2) Find the Regression Line.

3) Plot the linear regression on top of the scatterplot to see the fit.

Asbestos Exposure Versus Percent of Rats That Develop Lung Tumors

Asbestos Exposure (fibers/mL)	% that develop lung tumors
50	2
400	6
500	5
900	10
1100	26
1600	42
1800	37
2000	28
3000	50

1) Make a scatterplot of the data

2) Find the Regression Line.

3) Plot the linear regression on top of the scatterplot to see the fit.

Femur Length and Height

Fenur Length (cm)	Height (cm)
50.1	178.5
48.3	173.6
45.2	164.8
44.7	163.7
44.5	168.3
42.7	165.0
39.5	155.4
38.0	155.8

1) Make a scatterplot of the data

2) Find the Regression Line.

3) Plot the linear regression on top of the scatterplot to see the fit.

4) An anthropologist finds a femur length of 58 cm. How tall was the person?

David is conducting an experiment to estimate the acceleration of an object due to gravity. He takes a ball and drops it from different heights and records the time it takes for the ball to hit the ground using an optic laser connected to a stop watch. He collects the following data.

Time (seconds)	Distance (feet)
1.003	16
1.365	30
1.769	50
2.093	70
2.238	80

a) Draw a scatter plot using time as the independent variable and distance as the dependent variable.

b) Find a power function of best fit to the data.

c) Graph the data points and the power function of best fit.

d) Predict how long it will take an object to fall 100 feet.

e) Physics theory states that the distance that an object falls is directly proportional to the time squared. Rewrite the model found in part b) so that it is of the form $s = \frac{1}{2}gt^2$, where s is distance, g is the acceleration due to gravity, and t is time. What is David's estimate of the acceleration of gravity.

A chemist has a 100 gram sample of a radioactive material.
He records the amount of radioactive material every week for
6 weeks and obtains the following data.

Week	Weight (in grams)
0	100.0
1	88.3
2	75.9
3	69.4
4	59.1
5	51.8
6	45.5

a)   Draw a scatter plot with week as the independent variable.

b)   Find the equation of an exponential curve to the data in the
     form of $A(t) = A_0 e^{kt}$

c)   Graph the scatter plot and the equation of the curve of best fit.

d)   Determine the half life of the material.

e)   How much radioactive material will be left after 1 year?