ISE 2211 Statistics for Engineers

Homework #10a - Chapter 11 Regression & Correlation (Montgomery & Runger, 6ed)

1. Use the numbered textbook problems only as references to help add meaning to the data.
2. Do NOT solve the problems as stated in the textbook.
3. Use the methods discussed in class to find the following for each of the numbered problems.
    a. Calculate the correlation coefficient r.
    b. Determine whether or not there is significant correlation between the variables.
    c. Write the regression equation.
    d. Use the regression equation to determine the value of Y, given the value of X.

Page 437 #11-8 X = Engine Displacement (cubic inches) Y = Mile per Gallons (mpg)

n	Σ X	Σ Y	Σ X^2	Σ Y^2	Σ XY
21	5017	620.5	1436737	18986	138663

Predict MPG for an engine displacement of 150 cubic inches.

Answers:

r = - 0.769 t_{test} = - 5.24

$t_{\alpha/2}$ = ± 2.093

y = 39.2 - 0.0402 x

y = 39.2 - 0.0402 (150) = 33.2 mpg

Page 437 #11-10 X = Sound Pressure Level (dB) Y = Evoked Blood Pressure Rise (mm Hg)

n	Σ X	Σ Y	Σ X^2	Σ Y^2	Σ XY
20	86	1656	494	140176	7654

Predict Blood Pressure (mmHg) for a Sound Pressure Level of 6.5 dB's.

Answers:

r = 0.865 t_{test} = 7.314

$t_{\alpha/2}$ = ± 2.101

y = 64.3 + 4.29 x

y = 64.3 + 4.29 (6.5) = 92 mm Hg

Page 438 #11-13 X = Age (weeks) Y = Strength (psi)

n	Σ X	Σ Y	Σ X^2	Σ Y^2	Σ XY
20	267	42648	4672	92642656	527620

Predict Strength (psi) for an Age of 18.5 weeks.

Answers:

r = - 0.9466 t_{test} = - 12.46

$t_{\alpha/2}$ = ± 2.101

y = 2625 - 37 x

y = 2625 - 37 (18.5) = 1940.5 psi

4. Rework each of the problems using the "Alternate Form"; of course you should obtain the same results!

	S_{xx}	S_{yy}	S_{xy}
# 11-6	238152	651	- 9578
# 11-8	124	3060	+533
# 11-11	1115	1699421	-41200