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Department of Mathematics & Statistics
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Quiz #6

Name: *ID:* *Serial:*

Q1: The managers of a brokerage firm are interested in finding out if the number of new clients a broker brings into the firm affects the sales generated by the broker. They sample 12 brokers and determine the number of new clients they have enrolled in the last year and their sales amounts in thousands of dollars. These data are presented in the table that follows.

Clients	27	10	42	33	15	15	25	36	28	30	17	22
Sales ($1000's)	52	34	64	55	29	34	58	59	44	48	31	38

You may use the following

$$Sxx = 1010, \quad Syy = 1625, \quad Sxy = 1151, \sum x = 300 \ \& \sum y = 546$$

a. Find the prediction for the amount of sales for a person who brings 25 new clients into the firm.

b. Calculate the standard error of the estimate for this relationship.

c. Do you think that, at 5% level of significant, there is a positive linear relationship between amount of sales and number of clines in the firm?

d. Find an approximate 90% confidence interval for the amount of sales for a person who brings 25 new clients into the firm.

Q 2: The electric power consumed each month by a chemical plant is thought to be related to the average ambient temperature (x1), the number of days in the month (x2), the average product purity (x3), and the tons of product produced (x4). The past years historical data are available and are presented in the following output:

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Analysis of Variance

Source             DF      SS       MS      F       P
Regression          4    5441.4   1360.4   9.58   0.006
Residual Error      7     993.6    141.9
Total              11    6435.0

S = 11.912    R-Sq = 84.55%    R-Sq(adj) = 75.7%

Predictor     Coef   SE Coef      T       P
Constant    -122.5     159.5   -0.77   0.467
x1          0.7805    0.2854    2.74   0.029
x2           7.197     4.004    1.80   0.115
x3           2.556     1.834    1.39   0.206
x4         -0.4864    0.5610   -0.87   0.415
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Based on the above output, answer the following questions.

a. Predict the power consumption for a month in which $x_1 = 30, x_2 = 25, \ x_3 = 90, \ \& \ x_4 = 100$

b. What is the value of the estimate of σ.

c. Find the value of R^2, and how to interpret it?

d. Is the overall model significant at $\alpha = 0.05$? (write the hypothesis, the decision and the conclusion)

e. Based on the output, test the following hypotheses $H_0: \beta_j = 0 \ \ vs. \ H_0: \beta_j \neq 0$.

f. Given that SSR(x1x2) = 5085.9, at 5% level of significant, determine whether x3 & x4 makes a significant contribution on the regression model. write the hypothesis, the decision and the conclusion)