Course: STAT-319
Term: 181
Homework # 6
Material: Chapter 11
Due Date: Sunday, 02-December-2018

Q1: A motorist found that the efficiency of her engine could be increased by adding lubricating oil to fuel. She experimented with different amounts of lubricating oil and the data are

Amount of lubricating oil (ml)	Efficiency (%)
0	60
25	70
50	75
75	81
100	84

a) Obtain the least squares fit of a straight line to the amount of lubricating oil.
b) Test whether or not the slope $\beta_1 = 0$. Take $\alpha = 0.05$ as your level of significance.
c) Give a point estimate of the mean engine efficiency when the amount of lubricating oil is 450 ml.
d) What additional danger is there when using your estimate in part (c)?

Q2: The level of pollution because of vehicular emissions in a city is not regulated. Measurements by the local government of the change in flow of vehicles and the change in the level of air pollution (both in percentages) on 12 days yielded the following results:

Change in flow of vehicles x	Change in level of air pollution y
28	22
36	26
15	15
19	18
24	21
18	17
25	21
40	31
63	52
12	8
16	17
21	20

a) Make a scatter plot to verify that it is reasonable to assume that the regression of y on x is linear.
b) Fit a straight line by the method of least squares.
c) Find a 95% confidence interval for the mean change in the level of air pollution when the change in the flow of vehicles is 30%.

Q3: With reference to Q2, find 99% limits of prediction for the level of air pollution when the flow of vehicles is 30%.

Q4: The following data pertain to the processing speed (GHz) of a computer and the time (minutes) it takes to boot up:

a) Calculate the strength of linear association between the processing speed and boot time.
b) Test that there is a negative linear relationship between the processing speed and boot time. Use $\alpha = 0.1$.

Processing Speed	Boot Time
1.2	5
1.0	1
1.3	3
1.6	2
1.8	4
1.1	8
0.8	1
0.9	7
1.1	1
1.4	2
1.3	4
1.2	3
1.1	8
1.7	1
0.5	6
0.8	2
1.5	9
1.6	1
1.3	10
1.7	5
2.0	1
1.4	2
1.2	3
1.5	6