**Suaray 9.17.15**

**MATH 410/510: REGRESSION ANALYSIS- QUIZ**

You are allowed 60 min to complete this quiz. There are a total of 50 possible points. You must show all work to get credit. Please do not hesitate to raise your hand if you have a question.

1. **(5Points)** What is the simple linear regression model? **Identify meaning of all variables**. What are the assumptions made? What additional assumption needs to be made in order to find the maximum likelihood estimators?

**MODEL:**

**ASSUMPTIONS**

|  |  |
| --- | --- |
| 1. | 3. |
| 2. | 4. |

Additional Assumption 5:

2.a. **(30Points) (You cannot use SAS for this problem)** Suppose we have data for which we can be confident that the y-intercept is zero. Under the standard assumptions, derive the *least squares* estimate of the slope .

b. Derive a formula for the variance of your estimate in a.

c.Suppose that we observe the data (1,1), (2,4) and (3,3) for this model. What is the estimate of ? What is the standard error your estimate? Find a 95% confidence interval for .

1. **(15Points)** *Use the datafile* ***Overhead*** *located in the “CONTENT” section of Beachboard to answer this question. You may use any part of the SAS proc reg output to answer this question.*

A company wants to be able to estimate its overhead cost (y) based on total labor hours (x) of employees in a certain division using the standard simple linear regression model. The file gives the data for the past 16 months. Based on the data collected,

* 1. Test whether labor hours in an important predictor variable (use significance level 0.10). Graph the rejection region and show where the test statistic falls.
  2. Calculate a 95% confidence interval for the intercept in this model. Do your results indicate that the model introduced in problem #1 in this quiz might be more appropriate for this data?
  3. Identify the coefficient of determination. What does its value indicate?
  4. Give a point estimate for the mean overhead corresponding to 800 hours of labor.