Econ 466, Fall 2004
Midterm Examination 1
Total: 100 points
Time: 1 hour and 15 minutes

Note: Answer all questions. Write clearly and legibly. **Good Luck!!**

1. You are given the following 6 data points on Y and X. The Y values are: -4, -2, 4, 2, 0, 3. The corresponding X values are: -3, -1, 0, 2, 3, 4.

(i) Using these numbers compute $\sum_{i=1}^{6} X_i, \sum_{i=1}^{6} Y_i, \sum_{i=1}^{6} X_i Y_i, \sum_{i=1}^{6} X_i^2$ **(12 points)**

(ii) Use the numbers in (i) to estimate the intercept and slope coefficients for the regression $Y = \beta_0 + \beta_1 X + u$. **(8 points)**

(iii) Compute $SST = \sum_{i=1}^{n} (Y_i - \bar{Y})^2, SSE = \hat{\beta}_1^2 \sum_{i=1}^{6} (X_i - \bar{X})^2$ and R^2. **(8 points)**

(iv) Find the estimated standard error of $\hat{\beta}_1$. **(6 points)**

(v) Compute $\hat{\sigma}^2$ and t values for the null hypothesis $\hat{\beta}_1 = 0$ **(4 points)**

(i) Compute $\hat{\sigma}^2$, the estimated standard error of $\hat{\beta}_1$ and the t value for the null hypothesis $\hat{\beta}_1 = 0$. **(10 points)**

2. Using **43 observations** you estimated the following model

$$\ln Y = \beta_0 + \beta_1 S + \beta_2 N + u \qquad (1)$$

and obtained the following result

$$\ln \hat{Y} = 8.71 + 0.14\,S + 0.023\,N, \; R^2 = 0.37 \qquad (2)$$

$$(0.113) \;\; (0.005) \;\; (0.009)$$

where $\ln \hat{Y}$ = the natural log of earnings, S = years of schooling, and N = years of experience. Standard errors are in parentheses.

(i) Interpret in simple English the coefficients associated with S and N in the above regression. **(8 points)**

(ii) Test the hypothesis that schooling has no effect on earnings at the 5% level of significance. **(6 points)**

(iii) Compute the 95% confidence interval of β_2 and show how the test result in (ii) is related to the confidence interval. **(6 points)**

(iv) Find the p value of the test $\beta_2 = 0$ against the alternative that $\beta_2 > 0$. **(8 points)**

(v) Your friend knows only how to run a simple regression, and he used only schooling in his regression and obtained the following result

$$\ln \hat{Y} = 8.98 + 0.19\,S\,,\ R^2 = 0.32 \qquad (3)$$

$$(0.119)\ \ (0.007)$$

Do you think that he did something wrong? We derived a result that relates the estimated coefficient of a simple regression which is $\hat{\alpha}_1 = \hat{\beta}_1 + \hat{\beta}_2.\hat{\delta}$ where $\hat{\beta}_0$, $\hat{\beta}_1$ and $\hat{\beta}_2$ are the estimated coefficients of the multiple regression, $\hat{\alpha}_0$ and $\hat{\alpha}_1$ are the estimated coefficients of the simple regression, and $\hat{\delta}$ is the slope coefficient of the regression N on S. Use this result to find $\hat{\delta}$ and explain to him what is wrong with his regression. When do you think your result will be identical to that of your friend? **(12 points)**

(vi) How would you test the hypothesis $2\beta_1 + 4\beta_2 = 0$ using (1)? Describe all the steps that you need to do to get the job done in Excel. **(8 points)**

(vii) How would you test the joint hypothesis $\beta_1 = 0$ and $\beta_2 = 1$? Describe all the steps in details. **(8 points)**

(viii) Test the joint hypothesis that $\beta_1 = \beta_2 = 0$ (no regression) at the 5% level of significance. **(6 points)**