Name **Surname** **Student ID.**

DUE DATE : Thursday 3^{rd}, December 2015.

Assignment 6

1. Consider an equation to explain salaries of CEOs in terms of annual firm sales, return on equity (ROE in percentage form), and return on the firm's stock (ROS, in percentage form):

$$log(salary) = \beta_0 + \beta_1 log(sales) + \beta_2 ROE + \beta_3 ROS + u$$

(i) In terms of the model parameters, state the null hypothesis that, after controlling for sales and ROE, ROS has no effect on CEO salary. State the alternative hypothesis that better stock market performance increase a CEO's salary.

(ii) Using the sample data, the following equation was obtained by OLS:

$$\begin{aligned} \widehat{\log(\text{salary})} &= 4.32 + 0.280\ \log(\text{sale}) + 0.0174\ \text{ROE} + 0.00024\ \text{ROS} \\ &\quad (0.3200) \quad (0.0350) \quad (0.0041) \quad (0.00054) \end{aligned} \tag{Eq.1}$$

$$R^2 = 0.283 \quad n = 209$$

By what percentage is salary predicted to increase if ROS increase by 50 points?
Does ROS have a practically large effect on salary?

(iii) Test the null hypothesis that ROS has no effect on salary against the alternative that ROS has a positive effect. Carry out the test at the 10 %

(iv) Would you include ROS in a final model explaining CEO compensation in terms of firm performance? Explain.

2. Consider the estimated model explaining college GPA (colGPA), with the hight school GPA (hsGPA), the ACT Test (ACT), and the average number of lectures missed per week (skipped)
The estimated model is

$$\begin{aligned} \widehat{\text{colGPA}} &= 1.39 + 0.412\ \text{hsGPA} + 0.015\ \text{ACT} - 0.083\ \text{skipped} \\ &\quad (0.33) \quad (0.094) \quad (0.011) \quad (0.026) \end{aligned} \tag{Eq.2}$$

$$R^2 = 0.234 \ \ n = 141$$

(i) Using the standard normal approximation, find the 95% confidence interval for β_{hsGPA}.

(ii) Can you reject the hypothesis $H_0 : \beta_{hsGPA} = 0.4$ against the two-sided alternative at the 5% level?

(iii) Can you reject the hypothesis $H_0 : \beta_{hsGPA} = 1$ against the two-sided alternative at the 5% level?

3. Consider the following cost function for electricity generation:

$$Y = AX^{\beta} P^{\alpha_1} P^{\alpha_2} P^{\alpha_3} u \tag{Eq.3}$$

where
Y=total cost of production
X=output in kilowatt hours
P_1=price of labor input
P_2=price of capital input
P_3=price of fuel input
u=disturbance term

Theoretically, the sum of the price elasticities is expected to be unity, i.e., $\alpha_1 + \alpha_2 + \alpha_3 = 1$. By imposing this restriction, the preceding cost function can be written as

$$(Y/P_3) = AX^{\beta}(P_1/P_3)^{\alpha_1}(P_2/P_3)^{\alpha_2} u \tag{Eq.4}$$

In other words, Eq.3 is an unrestricted and Eq.4 is the restricted cost function.
On the basis of a sample of 29 medium-sized firms, and after logarithmic transformation, the estimated regression results are following:

$$\begin{array}{rcl} \widehat{ln(Y_i)} & = & -4.93 + 0.94\ ln(X_i) + 0.31\ ln(P_1) - 0.26\ ln(P_2) + 0.44\ ln(P_3) \\ & & \quad (1.96) \quad (0.11) \quad (0.23) \quad (0.29) \quad (0.07) \end{array} \tag{Eq.5}$$

$$RSS = 0.336 \ \ n = 29$$

$$\begin{array}{rcl} \widehat{ln(Y/P_3)} & = & -6.55 + 0.91\ ln(X) + 0.51\ ln(P_1/P_3) + 0.09\ ln(P_2/P_3) \\ & & \quad (0.16) \quad (0.11) \quad (0.19) \quad (0.16) \end{array} \tag{Eq.6}$$

$$RSS = 0.364 \ \ n = 29$$

(i) Interprete Eq.5 and Eq.6

(ii) How would you find out if the restriction $(\alpha_1 + \alpha_2 + \alpha_3) = 1$ is valid? Show your calculations.