Problem Set 2

(Submit through the Hub by 12pm October 26th)

1. Use the data in discrim.RData to answer this question. These are ZIP code-level data on prices for various items at fast-food restaurants, along with characteristics of the zip code population, in New Jersey and Pennsylvania. The idea is to see whether fast-food restaurants charge higher prices in areas with a larger concentration of blacks.

   (a) Consider a model to explain the price of soda in its log form, $\log(psoda)$, in terms of the proportion of the population that is black and log of median income:

   $$\log(psoda) = \beta_0 + \beta_1 prpblck + \beta_2 \log(income) + u.$$

   Estimate the model and report your results (including SRF, the sample size, and R-squared). If $prpblck$ increases by .20, what is the estimated percentage change in $psoda$?

   (b) Compare the estimate from part (a) with the simple regression estimate from $\log(psoda)$ on $prpblck$. Is the discrimination effect larger or smaller when you control for income? Explain.

   (c) Now add the variable $prppov$ to the regression in part (a). What happens to $\hat{\beta}_{prpblck}$?

   (d) Find the correlation between $\log(income)$ and $prppov$. Is it roughly what you expected?

   (e) Evaluate the following statement: ``Because $\log(income)$ and $prppov$ are so highly correlated, they have no business being in the same regression."

2. Using the data set ceosal1.RData to answer the following questions. 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):

   $$\log(salary) = \beta_0 + \beta_1 \log(sales) + \beta_2 roe + \beta_3 ros + u$$

   (a) 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 that better stock market performance increases a CEO's salary.

   (b) Estimate the model and report your results (including SRF, the sample size, and R-squared). By what percentage is $salary$ predicted to increase if ros increases by 50 basis points? Does ros have a practically large effect on $salary$?

   (c) 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% significance level (please show clearly the test statistic and the critical value used in your testing).

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

Important: Please also submit the relevant portions of your log file (delete errant commands and output).