BUEC 333---Fall 2010
Assignment #2 ANSWERS

Due in Tutorial Week of 19 Oct 2010

1) [Midterm, Spring 2009] Let *n=10*. If a single random variable *X* has a normal distribution with mean μ and variance σ^2 then:
   a) *X* takes positive values only
   b) $(X-\mu)/\sigma^2$ has a standard normal distribution
   c) $(X-\mu)^2/\sigma^2$ has a chi-squared distribution with *n* degrees of freedom
   d) $(X-\mu)/(s/\sqrt{n})$ has a *t* distribution with *n-1* degrees of freedom
   e) none of the above (1 points)

2) [Midterm, Spring 2009] Suppose you have a random sample of 10 observations from a normal distribution with mean 8 and variance 3. The sample mean ($\bar{x}$) is 10 and the sample variance is 2. What is the mean and variance of the sampling distribution of $\bar{x}$?
   mean is 8, variance is 0.3=3/10 (1 points)

3) Suppose you have a random sample of *n* observations, denoted $X_1, X_2, \ldots, X_n$. Suppose that the population from which the sample is drawn has mean μ and variance σ^2. As usual, you do **not** know the value of μ or σ^2.
   a) Suppose you calculate the sample mean $\bar{X}$. What is the relationship between $\bar{X}$ and μ? Be precise.
      the mean of $\bar{X}$ is μ (0.5 point)
   b) What does the sampling variance of $\bar{X}$ measure? Provide an unbiased estimator of it, and **show** that it is unbiased.
      I**ts sampling variance measures the variance of the distribution of $\bar{X}$. Proof is in ppt notes. (1 point)**
   c) Now suppose that the quantity you **really** want to estimate is the square of the population mean: μ^2.
      i) Is $(\bar{X})^2$ an unbiased estimator of μ^2? If yes, show it. If not, give an alternative estimator of μ^2 that **is** unbiased (and be sure to **show** that it's unbiased!).
      ii) Now find another unbiased estimator of μ^2 (yes, there's more than one). Be sure to **show** that your new estimator is unbiased).
      iii) You now have 2 unbiased estimators of μ^2. Which is more efficient? Show it, and sketch the sampling distributions of your two estimators.
      Any thoughtful discussion of this is worth 0.5 point. No proof necessary (we didn't get there).

Part 3: EViews Exercises

The following questions use the Eviews workfile pumf2006_greatervancouver.wf1 on posted on the course website. These are the data that I used for your first lecture. The census long form, and the data codebook are also posted. You will need all 3 files to do the assignment.

For each question, provide a short written answer and attach a hardcopy of the EViews output you used to answer the question. It may be helpful to use the command window, and keep a copy of the commands you use. If you do this, please submit the command line you use along with your assignment.

The purpose of this assignment is to have you run a regression and interpret its output. **Your objective is to try to find out how annual earnings from wages and salaries vary with the highest level of schooling of a person.**

6 points total:

4) Who should be in your sample? Why? Compute the average of WAGES for the sample of people of individuals that you have decided you want to learn about.
   0.5 points if they do it. 0.5 if they answer the Why
5) What should the regressors be? Why? Run a regression of WAGES on your regressors. Show the output.
   Any thoughtful answer to the why gets 0.5 points. Output with more than 1 regressor gets 0.5.
6) For each regressor, describe the meaning of the estimated coefficient in terms of how WAGES differ between persons with different characteristics. For regressors that are very similar to each other, you may aggregate your descriptions.
   M**arginal effects, derivatives, thought experiments are all reasonable answers. Any explanation that is correct is worth 0.5 point.**
7) What do the regression coefficients tell you about how much higher WAGES is for a person with a BA in comparison to a person with just a high-school certificate? Be precise.
   C**orrect reading of the output is worth 1 point.**
8) Is this increase in WAGES the same for a person who is 25 years old as it is for a person who is 40 years old? Why or why not?
   0.5 points
9) Now run a regression with the same regressors, but with the natural logarithm of WAGES as the regressand. Show the output.
   N**o points (didn't get there in time).**
10) Do the coefficients tell a different story? Why or why not?
    0.5 points
11) Stick with the regression with log(WAGES). Think about what might be left out of the regression equation. Ask yourself what 2 other regressors might have been good to include. Defend your choices. Run another regression with these 2 additional regressors. Report the output.
    1 point for a reasonable argument for belonging. Reasonableness hinges on whether the relevance of the new regressors.
12) Do the coefficients change much across your 2 specifications? Why or why not?
    0.5 points for showing the change, no extra for saying why (we didn't get there).