Economics 421 Pre-Quiz

Name (first and last): Pre-Quiz Key

Instructions Complete this short quiz to the best of your ability. Points will be given for effort. Extra-credit points are available for higher scores. You may leave class after you complete the quiz.

Important Don't worry if you cannot give a perfect answer. Give your best effort. No phones, calculators, or outside materials. *Any* cheating could earn you a zero in this class.

01. Define the term "variance."

Answer Variance tells us about a random variable's dispersion/variability/deviation (relative to its mean). Alternative: variance is one way to know how much a variable changes. Mathematically:

$$\text{Var}(X) = E\Big[(X - \mu_X)^2\Big]$$

where μ_X is the mean of X, *i.e.*, $E[X]$.

02. For the equation $\text{Crime}_i = \alpha + \beta\,\text{Police}_i + u_i$, if the number of police officers (given by Police) increases by 1 unit, how much do we expect crime (given by Crime) to change?

Answer Based upon the equation, for each 1-unit increase in *police*, we expect a β-unit increase in *crime*.

03. Imagine we are testing the null hypothesis $\text{H}_0\ \mu = 3$ against the alternative hypothesis $\text{H}_\text{a}\ \mu \neq 3$. If the p-value is 0.001, what should we conclude?

Answer With a p-value below 0.05 (0.001 < 0.05), we reject the null hypothesis ($\text{H}_0\ \mu = 3$) and state that there is statistically significant evidence (at the 5-percent level) that H_a is true—*i.e.*, that μ is not 3.

04. For the estimated regression model $\hat{y}_i = 1.3 + 5.4x_i$, interpret the intercept.

Answer The intercept tells us our expected value for the variable y when the variable x is equal to zero. Thus, when $x_i = 0$, we expect y_i will be 1.3.

05. Define the concept of the *median*.

Answer The median is the value "in the middle" of a distribution—meaning it has the same number of observations above and below it.

06. What does the notation $E[X]$ mean?

Answer $E[X]$ is notation for "the expected value of X", which is the *mean* of the random variable X.

07. For $\log(Q_i) = 12 + 0.8\log(P_i) + u_i$, interpret the slope. *Note:* P denotes price, and Q refers to quantity.

Answer For the "log-log" model, our slope term denotes an elasticity. Thus, for a 1% increase in price, we expect a 0.8% increase in quantity.

08. Define the concept of a *mean*.

Answer The *mean* gives us the expected outcome (or average outcome) for a distribution—also thought of as its center. If we repeatedly draw from a distribution, the average outcome will be the mean.

09. Define the term "standard error."

Answer "Standard error" refers to the standard deviation of the distribution for an estimator (*e.g.*, our linear-regression estimator).

10. Answer each of the next three questions as honestly as possible. Use only 1–2 sentences per answer.

A. What do you hope to get out off this class?

B. Why are you an economics major (or whichever major you've chosen)?

C. Why do you want a college degree?