

Econometrics Test

2010 - 06 - 16

Name: _____

1. Say if the following statements are unambiguously true (TRUE), unambiguously false (FALSE) or impossible to classify the way they are stated (CAN'T SAY). Write the motivations to your answers **only** in the space provided. A "CAN'T SAY" answer with no motivations will be considered wrong.

(a) If A and B are diagonal matrices, $AB = BA$.

TRUE

☐

FALSE

☐

CAN'T SAY

☐

(b) If X and Y are independent χ^2 variables with 1 degree of freedom, their correlation is 0.

TRUE

☐

FALSE

☐

CAN'T SAY

☐

(c) If a regression does not include a constant term, the mean of the residuals is not zero.

TRUE

☐

FALSE

☐

CAN'T SAY

☐

(d) If $\mathbf{x} \sim N(0, I)$, then $\mathbf{x}'\mathbf{x} \sim \chi^2$.

TRUE

☐

FALSE

☐

CAN'T SAY

☐

(e) The Chow test can be computed via a variable addition test.

TRUE

☐

FALSE

☐

CAN'T SAY

☐

2. Consider an iid sample x_1, x_2, \dots, x_n of random variables whose support includes all positive real numbers. Suppose that $E(x_i) = e^\theta$. Now consider the following two statistics:

$$\begin{aligned}\tilde{\theta} &= \frac{1}{n} \sum_{i=1}^n \ln x_i \\ \hat{\theta} &= \ln \left[\frac{1}{n} \sum_{i=1}^n x_i \right]\end{aligned}$$

say which one is **not** a consistent estimator of θ and why.

3. Consider the following data, taken from a sample of 100 observations

$$\begin{array}{lll}\sum_{i=1}^n y_i^2 = 204 & \sum_{i=1}^n x_i y_i = 110 & \sum_{i=1}^n z_i y_i = 10 \\ & \sum_{i=1}^n x_i^2 = 125 & \sum_{i=1}^n z_i x_i = 25 \\ & & \sum_{i=1}^n z_i^2 = 25\end{array}$$

and imagine that you want to estimate the following linear model:

$$y_i = x_i \beta_1 + z_i \beta_2 + \epsilon_i$$

Compute:

- (a) the OLS estimate of (β_1, β_2)
- (b) a consistent estimate of $\sigma^2 = V(\epsilon_i)$
- (c) a test for the hypothesis $\beta_1 = 0$ and the estimate of β_2 under the same constraint
- (d) a test for the hypothesis $\beta_1 + \beta_2 = 0$ and the estimate of β_2 under the same constraint