

Econometrics Test

2010 - 06 - 30

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) The matrix $\begin{bmatrix} a & a \\ 1 & 1 \end{bmatrix}$ is singular.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

(b) A consistent estimator cannot be more efficient than an unbiased one.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

(c) The regression function is always linear.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

(d) Suppose X is an $n \times k$ matrix and the vector z is defined as $z = X \cdot \alpha$ for some nonzero vector α . Then $M_z M_X = M_X$.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

(e) The distribution of the RESET test is a χ^2 variate with 2 degrees of freedom.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

2. Consider an iid sample x_1, x_2, \dots, x_n of random variables whose support is $[0, \infty)$ and whose density function is

$$f(x_i) = \frac{\alpha^8}{5040} x_i^7 \exp\{-\alpha x_i\}$$

- (a) Find a consistent estimator of α
 - (b) Devise a test statistic for the hypothesis $H_o : \alpha = 8$
3. Suppose you regress the years of education for an individual y_i on a constant, their age in decades a_i and gender g_i (1=male), so for example a 45-year old man will have $a_i = 4.5$ and $g_i = 1$. The results are as follows:

$$\begin{aligned} \hat{y}_i &= 12 - 0.5a_i - 1.2g_i \\ \widehat{V(\hat{\beta})} &= \begin{pmatrix} 0.08 & -0.02 & -0.01 \\ -0.02 & 0.005 & -0.001 \\ -0.01 & -0.001 & 0.02 \end{pmatrix} \\ \hat{\sigma}^2 &= 4.5 \end{aligned}$$

- (a) Test the hypothesis that the expected years of schooling for men and women is the same.
- (b) Test the hypothesis that a 30-year old woman has the same expected years of schooling as a 50-year old man.