

Econometrics Test

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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) All positive definite matrices are also positive semi-definite.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (b) Symmetric idempotent matrices are positive semi-definite.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (c) If $E(X) = 10$, then $E(X^2) = 100$.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (d) If $X_n \xrightarrow{p} 10$, then $X_n^2 \xrightarrow{p} 100$.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (e) In a dynamic regression model, residual autocorrelation is a sign of incorrect dynamic specification.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

2. Suppose you have a dataset with 200 observations and the data matrices as follows:

$$\begin{aligned} X'X &= \begin{bmatrix} 64 & 64 \\ 64 & 100 \end{bmatrix} \\ X'y &= \begin{bmatrix} 192 \\ 228 \end{bmatrix} \\ y'y &= 5173.9 \end{aligned}$$

Calculate:

(a) The OLS statistic $\hat{\beta} = [\quad \quad]$

(b) The sum of squared residuals: $SSR = \underline{\hspace{2cm}}$

(c) The s^2 statistic: $s^2 = \underline{\hspace{2cm}}$

(d) Test the restriction $\beta_1 = 0$

Test type: Distribution: Test statistic:
 Decision: ACCEPT ☐ REJECT ☐

(e) Test the restriction $\beta_2 = 0$

Test type: Distribution: Test statistic:
 Decision: ACCEPT ☐ REJECT ☐

(f) Test the restriction $\beta_1 = \beta_2$

Test type: Distribution: Test statistic:
 Decision: ACCEPT ☐ REJECT ☐

(g) Assuming that

$$\sum_{i=1}^{200} e_i^2 \mathbf{x}_i \mathbf{x}_i' = \begin{bmatrix} 1280 & 1400 \\ 1400 & 2230 \end{bmatrix}$$

test the restriction $\beta_2 = 0$ using a heteroskedasticity-robust method

Test type: Distribution: Test statistic:
 Decision: ACCEPT ☐ REJECT ☐