

Name: _____

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ECONOMETRICS - 19-01-2017 - Time: 2 h 30'

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) An invertible matrix cannot be symmetric.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

(b) An invertible matrix must be square.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

(c) An idempotent matrix must be square.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

(d) Suppose you have a sequence of random variables such that $Y_n \sim N(0, 1/n)$; then, $Z_n = e^{Y_n} \xrightarrow{P} 0$

TRUE ☐ FALSE ☐ CAN'T SAY ☐

(e) The null hypothesis for the White test is homoskedasticity.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

2. Suppose you have a dataset for which you estimate the following model by OLS:

$$y_i = \beta_0 + \beta_1 x_i + \varepsilon_i$$

The data you have are

$$n = 400 \quad \bar{X} = n^{-1} \sum x_i = 2 \quad \bar{Y} = n^{-1} \sum y_i = 4$$

$$V(y) = n^{-1} \sum (y_i - \bar{Y})^2 = 27.5 \quad V(x) = n^{-1} \sum (x_i - \bar{X})^2 = 10 \quad \sum x_i y_i = 1200$$

Find the following quantities:

(a) $X'X = \begin{bmatrix} & \\ & \end{bmatrix} \quad X'y = \begin{bmatrix} \\ \end{bmatrix}$

(b) $\hat{\beta} = \begin{bmatrix} \\ \end{bmatrix}$

(c) $\hat{\sigma}^2 = \underline{\hspace{2cm}}$

(d) $\widehat{V(\hat{\beta})} = \begin{bmatrix} \\ \end{bmatrix}$

3. You estimated the following dynamic model

$$y_t = \alpha y_{t-1} + \beta_0 x_t + \beta_1 x_{t-1} + \varepsilon_t$$

and got the following estimates

$$\hat{\beta} = \begin{bmatrix} -0.20 \\ 0.42 \\ -0.87 \end{bmatrix} \quad \hat{V} = \begin{bmatrix} 0.0025 & -0.0017 & 0.0012 \\ -0.0017 & 0.0021 & -0.0013 \\ 0.0012 & -0.0013 & 0.0015 \end{bmatrix}$$

- (a) Write the dynamic multipliers $\delta_j = \frac{\partial y_t}{\partial x_{t-j}}$ in the space below:

Multiplier	δ_0	δ_1	δ_2	δ_3	δ_4
Numerical value					

- (b) Write the long-run multiplier: $c = \sum_{i=0}^{\infty} \delta_i = \underline{\hspace{2cm}}$

- (c) write the coefficients for the ECM form in the blank spaces:

$$\Delta y_t = k + \underline{\hspace{2cm}} \Delta x_t + \underline{\hspace{2cm}} - (\underline{\hspace{2cm}}) \cdot [y_{t-1} - \underline{\hspace{2cm}} x_{t-1}] + \varepsilon_t$$

- (d) test the hypothesis $\delta_0 = 0$;

Test type: Distribution: Test statistic:
 Decision: ☐ Reject ☐ Don't reject

- (e) test the hypothesis $c = 1$;

Test type: Distribution: Test statistic:
 Decision: ☐ Reject ☐ Don't reject