Econometrics Test
2012 - 09 - 12

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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) If the matrix P is idempotent then $P = P'$.
   TRUE ◯ FALSE ◯ CAN'T SAY ◯

   (b) If $P = P'$ then the matrix P is idempotent.
   TRUE ◯ FALSE ◯ CAN'T SAY ◯

   (c) Consider an estimator $\hat{\theta}$. If
   $$\lim_{n\to\infty} P(|\hat{\theta} - \theta| < \epsilon) = 0,$$
   where n is the sample size, θ is the parameter of interest and ϵ is an arbitrarily small positive real number, then $\hat{\theta}$ is consistent.
   TRUE ◯ FALSE ◯ CAN'T SAY ◯

   (d) In a regression model, the t-statistic on a coefficient is invariant to the unit of measurement of the corresponding variable.
   TRUE ◯ FALSE ◯ CAN'T SAY ◯

   (e) Heteroskedasticity makes OLS inconsistent.
   TRUE ◯ FALSE ◯ CAN'T SAY ◯

2. Suppose you have a dataset with 100 observations and the data matrices as follows:

$$\begin{aligned} X'X &= \begin{bmatrix} 192 & 120 \\ 120 & 300 \end{bmatrix} \\ X'y &= \begin{bmatrix} 319.2 \\ 402 \end{bmatrix} \\ y'y &= 4240.92 \end{aligned}$$

Calculate:

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

(b) The sum of squared residuals: $SSR =$ _____

(c) The s^2 statistic: $s^2 =$ _____

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

Test type: _____ Distribution: _____ Test statistic: _____
Decisione: ACCEPT ◯ REJECT ◯

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

Test type: _____ Distribution: _____ Test statistic: _____
Decisione: ACCEPT ◯ REJECT ◯

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

Test type: _____ Distribution: _____ Test statistic: _____
Decisione: ACCEPT ◯ REJECT ◯

(g) Assuming that

$$\sum_{i=1}^{100} e_i^2 \mathbf{x}_i \mathbf{x}_i' = \begin{bmatrix} 5952.0 & 2710.5 \\ 2710.5 & 5643.7 \end{bmatrix}$$

test the restriction $\beta_1 = 0$ using a heteroskedasticity-robust method

Test type: _____ Distribution: _____ Test statistic: _____
Decisione: ACCEPT ◯ REJECT ◯