Name: _____

Matricola: _____ email: _____

ECONOMETRICS - 02-05-2017 - Time: 2 h

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) Projection matrices are singular.

   TRUE ◯ FALSE ◯ CAN'T SAY ◯

   (b) If $E(y|x) = 0$, then the regression function is constant.

   TRUE ◯ FALSE ◯ CAN'T SAY ◯

   (c) If $E(y|x) = x^2$, then the linear model $y_i = \beta_0 + \beta_1 x_i^2 + \varepsilon_i$ is heteroskedastic.

   TRUE ◯ FALSE ◯ CAN'T SAY ◯

   (d) If $X_n \xrightarrow{\text{p}} 2$, then the probability that $3 \leq X_n \leq 4$ tends to 0 as $n \to \infty$.

   TRUE ◯ FALSE ◯ CAN'T SAY ◯

   (e) If $X_n \xrightarrow{\text{d}} N(2, 1)$, then the probability that $3 \leq X_n \leq 4$ tends to 0 as $n \to \infty$.

   TRUE ◯ FALSE ◯ CAN'T SAY ◯

2. Consider two versions of the same model:

$$y_i = \beta_0 + \beta_1 x_i + \beta_2 z_i + \beta_3 w_i + \varepsilon_i \quad (1)$$
$$y_i - x_i = \beta_0 + \beta_2 (z_i + w_i) + \varepsilon_i \quad (2)$$

Suppose that in a sample of size n the sums of squared residuals for (1) and (2) equal 400 and 450, respectively. Let H_0 be the hypothesis implicit in the model reduction.

(a) Write a pair of matrices R and $\mathbf{d}$ that you can use to express H_0 as $R\boldsymbol{\beta} = \mathbf{d}$.

$$R = \begin{bmatrix} \quad & \quad & \quad & \quad \end{bmatrix} \qquad \mathbf{d} = \begin{bmatrix} \quad \end{bmatrix}$$

(b) Calculate the minimum sample size that would lead to rejecting H_0 at a 5% significance level.

$n =$ _____

(c) Suppose that $\hat{\sigma}^2$ for model (1) equals 0.2. Would you reject H_0?

Test type: _____ Distribution: _____ Test statistic: _____

Decision: REJECT ◯ DON'T REJECT ◯

(d) Suppose you performed a White test on model (1) and rejected the corresponding null hypothesis. Would your conclusion about H_0 change?

Yes ◯ No ◯ Can't say ◯

_____

_____

_____

_____

3. Given the dynamic model $y_t = k + 0.8y_{t-4} + 0.6x_t - 0.8x_{t-1} + \varepsilon_t$,

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

$$\begin{aligned} \Delta y_t = {} & k + \underline{\qquad} \Delta x_t + \\ & + \underline{\qquad} \Delta y_{t-1} + \underline{\qquad} \Delta y_{t-2} + \underline{\qquad} \Delta y_{t-3} + \\ & -(\underline{\qquad}) \cdot [\, y_{t-1} - \underline{\qquad} x_{t-1} \,] + \varepsilon_t \end{aligned}$$

(b) 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	δ_5
Numerical value						

(c) Write the long-run multiplier: $c = \sum_{i=0}^{\infty} \delta_i =$ _____