

Name: _____

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ECONOMETRICS - 2022-07-01 - 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 (Not necessarily). Write the motivations to your answers **only** in the space provided. A “Not necessarily” answer with no adequate motivation will be considered wrong.

(a) The distribution function of a discrete random variable goes up in steps.

True ☐ False ☐ Not necessarily ☐

(b) If $E(y|x) = 0$, then $Cov(y, x) = 0$.

True ☐ False ☐ Not necessarily ☐

(c) If $E(y|x) = 0$, then y and x are independent.

True ☐ False ☐ Not necessarily ☐

(d) In a linear model like $\log(y_i) = \beta_0 + \beta_1 \log(x_i) + \varepsilon_i$ the elasticity of y_i to x_i is a constant.

True ☐ False ☐ Not necessarily ☐

(e) The Godfrey test may be computed by means of an auxiliary regression.

True ☐ False ☐ Not necessarily ☐

2. Suppose you have a sample of 400 individuals, 200 males and 200 females, and consider the following models

$$y_i = \beta_0 + \beta_1 x_i + \varepsilon_i \quad (1)$$

$$y_i = \beta_0 + \beta_1 x_i + \beta_2 g_i + \varepsilon_i \quad (2)$$

where x_i is a continuous variable and g_i is the gender dummy. The following table summarises the results of several regressions:

	Model (1) (full sample)	Model (2) (full sample)	Model (1) (males only)	Model (1) (females only)
const	0.9345*** (20.17)	0.9114*** (17.65)	1.128*** (17.13)	0.7522*** (12.02)
x	0.5641*** (6.723)	0.5606*** (6.675)	0.2135* (1.824)	0.9092*** (7.865)
d		0.04944 (1.010)		
<i>n</i>	400	400	200	200
<i>SSR</i>	95.123	94.879	46.051	44.728

t-statistics in parentheses

- (a) Compute the estimated variance for models (1) and (2):

$$\hat{\sigma}_1^2 = \underline{\hspace{2cm}} \quad \hat{\sigma}_2^2 = \underline{\hspace{2cm}}$$

- (b) Knowing that $\sum_{i=1}^{400} (y_i - \bar{y})^2 = 105.92522$, compute the centred R^2 index for models (1) and (2):

$$R_1^2 = \underline{\hspace{2cm}} \quad R_2^2 = \underline{\hspace{2cm}}$$

- (c) Test the hypothesis $\beta_2 = 0$ in model (2)

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

- (d) Compare models (1) and (2). Which one is preferable? Why?

- (e) Perform a Chow test for the absence of a structural break between males and females:

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

- (b) Is the families' propensity towards religion teaching uniform geographically? Motivate your answer.

- (c) Provide an interpretation of the coefficient for the **frat** variable.

- (d) Provide an interpretation of the coefficient for the **y** variable.
