

Econometrics Test

2012 - 04 - 16

Name: _____ Matricola: _____

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. Answers with no motivations will not be considered.

- (a) A projection matrix is invertible.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (b) If $f(Y|X) \neq f(Y)$, then $f(X|Y) \neq f(X)$ (where $f(\cdot)$ stands for “density function”).

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (c) If $E(Y|X) = a + bX$, where $a > 0$ and $8.34 < b \leq 9.16$, then $E(Y) = a + bE(X)$.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (d) If a linear model does not contain a constant term (also known as “the intercept”), then the residuals may have non-zero mean.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (e) Consider the model $\mathbf{y} = \mathbf{X}\boldsymbol{\beta} + \boldsymbol{\varepsilon}$; if \mathbf{X} is square and invertible, then the OLS residuals are a vector of zeros.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

2. Suppose that the number of road accidents that a person has in a year can be described by the following probability distribution:

$$\begin{aligned}P(0) &= e^{-a} \\P(1) &= a \cdot e^{-a} \\P(2 \text{ or more}) &= 1 - e^{-a}(1 + a)\end{aligned}$$

Suppose now that you observe a sample of 20000 drivers and that the distribution is the following:

No accidents	10000	50%
One accident	7000	35%
Two or more accidents	3000	15%
Total		20000 100%

Provide an estimate of the parameter a by using a consistent estimator and explain your choice.

3. The model below was estimated on a sample of 1119 Italian manufacturing firms and uses the following variables:

ndtftp9800 Increment in total productivity between 1998 and 2000;

resva98 Intensity of expenditure on research in 1998;

ictva98 Intensity of expenditure on ICT* in 1998;

loccu98 Log of total employment in 1998.

OLS, using observations 1-1119

Dependent variable: ndtftp9800

	coefficient	std. error	t-ratio	p-value	
const	-0.0425126	0.0369711	-1.150	0.2504	
resva98	0.449126	0.235173	1.910	0.0564	*
ictva98	0.131143	0.0890978	1.472	0.1413	
loccu98	0.00672260	0.00922593	0.7287	0.4664	
Mean dependent var	-0.006310	S.D. dependent var		0.327707	
Sum squared resid	119.3615	S.E. of regression		0.327186	
R-squared	0.005850	Adjusted R-squared		0.003175	
F(3, 1115)	2.186894	P-value(F)		0.087928	

Comment on the estimates above.

*Information and Communication Technology