Econometrics Test

2011 - 06 - 01

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) The rank of a matrix cannot be smaller than the number of its columns.

   TRUE ◯ FALSE ◯ CAN'T SAY ◯

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   _____

   _____

   (b) The χ^2 distribution has its support over the positive reals.

   TRUE ◯ FALSE ◯ CAN'T SAY ◯

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   (c) The Laws of Large Numbers are results on convergence in probability.

   TRUE ◯ FALSE ◯ CAN'T SAY ◯

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   _____

   (d) Unbiased estimators are always inconsistent.

   TRUE ◯ FALSE ◯ CAN'T SAY ◯

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   (e) In order to use the OLS statistic for valid inference, the dependent variable y and the explanatory variables X must be jointly Normal.

   TRUE ◯ FALSE ◯ CAN'T SAY ◯

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   _____

2. Suppose you have an iid sample of random variables for which the following equality holds:

$$E(x^n) = \beta^n \cdot p \cdot (p+1) \cdots (p+n-1)$$

   So, for example, $E(x) = \beta p$, $E(x^2) = \beta^2 p(p+1)$ etcetera. Show that the statistic $\hat{p} \equiv \frac{\bar{X}^2}{V}$ is a consistent estimator of p, where

$$\bar{X} = \frac{1}{n}\sum_{i=1}^{n} x_i \qquad V = \frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{X})^2$$

   (*Optional:* You may also try to find the asymptotic distribution of $\sqrt{n}(\hat{p} - p)$; not easy, but you get extra points if you do.)

3. Table 1 contains estimates of two alternative hedonic regression models[1] of auction prices for 1513 paintings. The dependent variable is the natural logarithm of the painting's price. The explanatory variables are:

larea	natural log of the painting area in square centimeters
year	year in which the auction took place
oil	dummy variable (1 if oil painting)
dead	dummy variable (1 if artist was dead at the time of auction)
wood	dummy variable (1 if painting on wood)
paper	dummy variable (1 if painting on paper)

(a) Can you reject the hypothesis that the size of a painting does not matter for its price (everything else being equal)?

(b) Can you reject the hypothesis that the elasticity of price with respect to size is 1 (everything else being equal)?

(c) Can you reject the hypothesis that the material used as physical support has no effect on the price (everything else being equal)?

(d) Someone told you that, when an artist dies, the price of his/her works quadruples. Is that claim justified?

Table 1: Hedonic Regressions for Paintings

	(A)	(B)
const	-63.77^{**}	-61.55^{**}
	(11.38)	(11.24)
larea	0.5343^{**}	0.5303^{**}
	(0.02363)	(0.02335)
year	0.03369^{**}	0.03262^{**}
	(0.005689)	(0.005621)
oil	0.2203^{**}	0.1996^{**}
	(0.05976)	(0.05913)
dead	1.494^{**}	1.458^{**}
	(0.06517)	(0.06463)
wood		-0.5147
		(1.079)
paper		-0.6380^{**}
		(0.1012)
$\bar{R}^2$	0.3422	0.3583
SSR	1797.172	1750.727

Standard errors in parentheses
* indicates significance at the 10 percent level
** indicates significance at the 5 percent level

[1] A *hedonic model* is a model in which the price of a good is explained by the good's characteristics.