

Econometrics - Module I

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Name: _____

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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 A and B are square matrices, $AB = I$ implies $BA = I$

TRUE ☐ FALSE ☐ CAN'T SAY ☐

(b) A covariance matrix may be singular.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

(c) If $X_n \xrightarrow{P} 0$, then the probability of $X_n = 0$ becomes negligible for some large n .

TRUE ☐ FALSE ☐ CAN'T SAY ☐

(d) Given the linear model $y_i = \beta_0 + \beta_1 x_i + \varepsilon_i$, if $\sigma_i^2 \neq \sigma_j^2$ for some i and j , where $\sigma_i^2 = E(\varepsilon_i^2 | x_i)$, then the OLS estimator $\hat{\beta}$ is inconsistent.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

(e) Dummy variables cannot be negative.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

2. The regression reported in Table 1 was computed for 1260 individuals from the US:

lwage natural log of hourly wage
 exper years of workforce experience
 expersq exper squared
 union = 1 if union member
 black = 1 if black
 female = 1 if female
 married = 1 if married
 south = 1 if live in south
 educ years of schooling

Dependent variable: lwage
 Heteroskedasticity-robust standard errors, variant HC1

	Coefficient	Std. Error	t-ratio	p-value
const	0.443808	0.0843811	5.2596	0.0000
exper	0.0382144	0.00426925	8.9511	0.0000
expersq	-0.000584478	9.46763e-05	-6.1734	0.0000
union	0.190220	0.0283892	6.7004	0.0000
black	-0.0462419	0.0610710	-0.7572	0.4491
female	-0.432932	0.0301705	-14.3495	0.0000
married	0.0212452	0.0314783	0.6749	0.4999
south	0.0592388	0.0328952	1.8008	0.0720
educ	0.0694855	0.00550398	12.6246	0.0000
Mean dependent var	1.658800	S.D. dependent var	0.594508	
Sum squared resid	278.0394	S.E. of regression	0.471438	
R^2	0.375164	Adjusted R^2	0.371168	
$F(8, 1251)$	108.5652	P-value(F)	1.7e-137	

White's test for heteroskedasticity: Test statistic: LM = 63.2676
 p-value = $P(\chi^2(38) > 63.2676) = 0.00618992$

Table 1: Wage equation

(a) Comment on the sign and magnitudes of estimated coefficients and suggest an interpretation for the results.

(b) Comment on the heteroskedasticity test and state whether the hypothesis tests reported in Table 1 can be considered credible or not.

(c) Suggest possible ways to improve the model.
