

**ECON 5340 Applied Econometrics – Exam #1**

True or False. Five points per question: 2 pts for a correct T/F and 3 pts for the explanation.

1. The OLS slope estimator is more efficient when the variance of  $X$  is high.
2. The OLS slope estimator cannot be calculated when  $X_2$  and  $X_3$  are correlated.
3. Assume that the true slope coefficient is positive. If the sample estimate is negative, the estimator is biased.
4. The OLS estimate of  $\beta$  from the model  $Y_i = \alpha + \beta \ln X_i + u_i$  is biased because the model is nonlinear.
5. The  $t$  test is not valid for fewer than 30 observations.

#6. (25 pts) Derive the OLS estimator for a regression model with one explanatory variable and no intercept. Check the second-order condition. Now consider the population regression function:  $Y_i = 2X_i + u_i$  and the sample:  $Y = (2,0,2,4)'$ ;  $X = (3,1,2,2)'$ . Find the estimated slope. Draw a figure showing the data points, sample regression line, population regression line, residuals, and error terms. Does the regression line go through the sample means? Is this expected or an accident?



**Table 1. STATA results from OLS estimation of the earnings model**

Number of obs = 100			
Source	SS	df	MS
-----+-----			
Model	2057.5037	2	1028.75185
Residual	6059.71269	97	62.4712648
-----+-----			
Total	8117.21639	99	81.9920847
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wage	Coef.	Std. Err.	
-----+-----			
exp	0.328525	0.0658247	
grade	1.435782	0.321546	
_cons	-11.91922	4.750254	
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