Answer each of the following equally weighted questions.

1) Econometric models are described as stochastic rather than deterministic. The stochastic nature of the models comes from the error term which we have labeled μ. Describe the sources of this error term and the assumptions we make about it in <u>deriving</u> the ordinary least squares estimator.

2) Suppose the true model is Y = " + X$^\$$ + e where e = Xv and v satisfies all the usual assumptions we make about the error. Which, if any, of the ordinary least squares assumptions are violated by the true model? Explain whether or not the true model can be estimated by ordinary least squares. Suppose you estimate the model Y = " + $X + μ. Will your estimates a and b of " and $ be accurate estimates of the parameters of the true model? Explain your answer.

3) Find the OLS estimates of the slope and intercept of the model Y =" + $X + μ for the following data:

$$\sum (Y_i - \bar{y})(X_i - \bar{x}) = 100$$

$$\sum (X_i - \bar{x})^2 = 400$$

The variance of μ is 1. Find the variance of your estimate of the slope. Using the 95% probability level, test the hypothesis that $ equals .5.

4) You have estimated the model Y = " + $X + μ. Your estimate of " is 4 and your estimate of $ is .5. The data from which these estimates were derived are:

Y	X
5	3
8	6
8	9

Use this information to estimate the variance of the model. State what is known about the predicted errors and their relationship to the independent variable and the predictions of the dependent variable. Demonstrate these relationships for the given data.

5) Suppose you are told that the value of X for the next observation is 7. Use the information in problem 4 to predict the actual value of Y for the next observation and construct a 95% confidence interval for your prediction.