Economics 170 Midterm Exam

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 deriving the ordinary least squares estimator.

2) List and explain the assumptions made about the model in deriving the ordinary least squares estimator. As part of your explanation, give an example.

3) Estimate the model Y = " + $X + μ from the data:

Y	X
3	5
1	6
2	9

Also use this information to estimate the variance of μ and of the slope estimate.

4) 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 data given in problem 3 and calculate the R squared for the model of problem 3.

5) Ordinary least squares estimates are said to be best linear unbiased. Explain what this means.

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

$$\sum (Y_i X_i) = 300$$

$$\sum X_i^2 = 1500$$

$$\bar{x} = 3,\ \bar{y} = 2,\ N = 100$$

where a variable with a bar over it represents the sample mean of that variable and N is the sample size. The true variance of μ is 100. Find the variance of your estimate of the slope. Using the 95% probability level, test the hypothesis that $ equals -1. How would your test differ if the estimated variance of μ equaled 100?