Homework 5
ECON 4818
Professor Martins

1. From your textbook, answer question 4 items (i)-(iii) in Appendix C, and questions 1, 2, 3 and 4 in Appendix D.

2. Consider the following simple linear regression model:

$$Y_i = \beta X_i + U_i \text{ for } i = 1, 2, \cdots, n.$$

where $E(U_i|X_i) = 0$ and $V(U_i|X_i) = \sigma^2$ and $\{U_i\}_{i=1}^n$ is a sequence of independent and identically distributed random variables.

   (a) Obtain the least squares estimator for β. Show that this estimator is unbiased and obtain its variance. Does the variance approach zero as the sample size $n \to \infty$? If so, is this a desirable property? Why?

   (b) Obtain an unbiased estimator for σ^2.

   (c) Suppose $U_i \sim N(0, \sigma^2)$ for every i. How would you construct a 95% confidence interval for β? How would you test the hypothesis that $\beta = 0$? And the hypothesis that $\beta = 1$?