1. Explain with reason whether the following statements are true, false, or uncertain:

   (a) Since the correlation between two variables, X and Y, can range from -1 to +1, this also means that \( \text{cov}(X, Y) \) also lies between these limits.

   (b) If the correlation between two variables is zero, it means that there is no relationship between the two variables whatsoever.

   (c) If you regress \( y_i \) on \( \hat{y}_i \), the intercept and slope values will be 0 and 1, respectively.

2. Consider the following formulations of two PRF:

   Model I: \( y_i = \beta_0 + \beta_1 x_i + u_i \)

   Model II: \( y_i = \alpha_0 + \alpha_1 (x_i - \bar{x}) + u_i \)

   (a) Find the estimators of \( \beta_1 \) and \( \alpha_1 \). Are they identical? Are their inverse identical?

   (b) What is the advantage, if any, of model II over model I?

3. (Wooldridge 2.7) Using data from 1988 for houses sold in Andover, Massachusetts, from Kiel and McClain (1995), the following equation relates housing price (\( price \)) to the distance from a recently built garbage incinerator (\( dist \)):

   \[
   \hat{\log(price)} = 9.40 + 0.312 \log(dist)
   \]

   \( n = 135, R^2 = 0.162. \)

   (a) Interpret the coefficient on \( \log(dist) \). Is the sign of this estimate what you expect it to be?
(b) Do you think simple regression provides an unbiased estimator of the ceteris paribus elasticity of price with respect to dist? (Think about the city’s decision on where to put the incinerator.)

(c) What other factors about a house affect its price? Might these be correlated with distance from the incinerator?

4. (Wooldridge 3.1) The data in WAGE2.RAW on working men was used to estimate the following equation:

$$\hat{educ} = 10.36 - 0.094sibs + 0.131meduc + 0.210feduc$$

$$n = 722, R^2 = 0.214,$$

where $educ$ is years of schooling, $sibs$ is number of siblings, $meduc$ is mothers years of schooling, and $feduc$ is fathers years of schooling

(a) Does $sibs$ have the expected effect? Explain. Holding $meduc$ and $feduc$ fixed, by how much does $sibs$ have to increase to reduce predicted years of education by one year? (A noninteger answer is acceptable here.)

(b) Discuss the interpretation of the coefficient on $meduc$.

(c) Suppose that Man A has no siblings, and his mother and father each have 12 years of education. Man B has no siblings, and his mother and father each have 16 years of education. What is the predicted difference in years of education between B and A?