Problem Set #3

(1) Suppose a researcher ran a regression of infant birthweight (in ounces), denoted BirthWeight, on the number of cigarettes the mother smoked per day while pregnant (Cigs). She obtained the following regression results:

\[ \hat{BirthWeight} = 119.6 - 0.0514Cigs. \]

(a) Interpret both the intercept and slope of this estimated regression relationship. Are the signs and magnitudes of the coefficient estimates consistent with what you expect? (Note: Pay attention to how BirthWeight is measured).

(b) Calculate the difference in expected birthweight between a mother who never smokes while pregnant and a mother who smokes 20 cigarettes per day (i.e., one pack).

(c) Do you think this simple regression necessarily picks up a causal relationship between cigarette consumption and birthweight? If not, what other factors might you be concerned about?

(2) Suppose a researcher ran a regression of consumption on after-tax income, and obtained the following results (where both consumption and income are measured in dollars):

\[ \hat{Consumption} = -124.84 + 0.853Income. \]

(a) Interpret the intercept in this equation. Is it reliable? (Note that no individuals in the sample had Income values less than $5,000).

(b) Interpret the coefficient on Income. Why should we expect it to be less than one?

(c) What is the predicted consumption for an individual earning $30,000 per year?
(d) How much would an individual have to earn per year in order to have a predicted consumption level equal to $50,000?

(3) Stock & Watson, Exercise 4.1, a,b,e

(4) Stock and Watson, Exercise 4.4. [In addition to the hint provided, also note that \( \bar{y} = \beta_0 + \beta_1 \bar{x} + \bar{\mu} \).] Finally, you can assume that \( x \) is a constant, and thus can be taken outside of any expectation.