

## Assignment 3

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### Chapter 2

Q11) (i) There are so many factors that affect the number of children ever born to a woman; including age, income, etc. Also, yes, it is correlated with level of education. People who have higher education are likely to be old. #

(ii) SLR4 fails, due to  $u$  is correlated with educ. #

$$Q4: (i) \hat{b}_{\text{weight}} = 119.77 - 0.514(0) = 119.77$$

$$\hat{b}_{\text{weight}} = 119.77 - 0.514(20) = 109.49$$

The effect of smoking on additional 20 cigarettes will cause an estimated 10.28 ounce.

→  $(119.77 - 109.49)$  decrease in the infant birth weight.

(ii) As the amount of cigarettes is the independent variable and the infant weight is dependent, it shows that there is a causal effect. However, there are other factors to be considered as well, such as genetics or parent's weight. Moreover, smoking habits can partially explain baby's weight.

$$(iii) \rightarrow 125 = 119.77 - 0.514 \text{ cigs}$$

$\text{cigs} = -10.17509728$ , which is not possible. The highest possible weight according to the model would be its  $\beta_0$  or intercept, which is 119.77 ounces.

(iv) In order to get a true sample, we should gain more data from more smokers. This will make our regression less limited and more accurate. We need more sample variation of  $X$  (SLR3). This is because 85% of the sample smoke cig. = 0. According to the rule of SLR2, the more sample is better. Hence, we can improve our regression function, so it is not as limited & will give us inaccurate data. #

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Q1: (i) Yes, it does make sense because if you are top of the class, the 'hsperc' will be low, and top class usually get high 'colgpa'. Hence, the coefficient is negative. #

$$\begin{aligned} \text{(ii) } \widehat{\text{Colgpa}} &= 1.392 - 0.0135(20) + 0.00148(19,050) \\ &= 1.392 - .27 + 1.554 \\ &= 2.676 \# \end{aligned}$$

$$\text{(iii) } \widehat{\text{Colgpa}} = 1.392 - 0.0135 \text{ hsperc} + 0.00148 \text{ sat}$$

→ Thus, increasing in SAT score for 1 mark will make the value of Colgpa changes for .00148

$$\rightarrow \frac{\partial \widehat{\text{Colgpa}}}{\partial \text{sat}} = .00148$$

→ A is predicted to have a score of .207 = (140)(.00148) higher.

It is quite large if we consider the standard deviation. #

$$\text{(iv) } .5 = 0.00148(\text{sat})$$

$$\text{sat} = \frac{.5}{.00148} = 337.837838 \#$$

→ We know that about 337.837838 in SAT score will make difference in .5 of a grade point. #

Q2: (i) Yes, the higher the number of years, the lower the year of schooling. This is because of the budget constraint. To hold other things constant,

$$\rightarrow \beta = -.0948 \text{ sibs}$$

→ sibs = 10.638 to reduce predicted years of education.

(ii) If mother's years of schooling increase by 1, the predicted year of school would increase by .131 #

$$\begin{aligned} \text{(iii) Man A predicted year of education} \\ &= 10.36 - 0.094(0) + 0.131(2) + 0.210(12) \\ &= 10.36 + 1.572 + 2.52 = 14.452 \# \end{aligned}$$

Man B predicted year of education

$$\begin{aligned} &= 10.36 - 0.094(0) + 0.131(16) + 0.210(16) \\ &= 10.36 + 2.096 + 3.36 = 15.816 \end{aligned}$$

∴ The predicted different is 1.364 #