**Homework 2 (Due on October 11th midnight)**

Chapter 3, page 120

**1**. Suppose we have a data set with ﬁve predictors, X1 = GPA, X2 = IQ, X3 = Gender (1 for Female and 0 for Male), X4 = Interaction between GPA and IQ, and X5 = Interaction between GPA and Gender. The response is starting salary after graduation (in thousands of dollars). Suppose we use least squares to ﬁt the model, and get = 50, = 20, =0 .07, = 35, =0 .01, =−10.

**(a)** Which answer is correct, and why?

i. For a ﬁxed value of IQ and GPA, males earn more on average than females.

ii. For a ﬁxed value of IQ and GPA, females earn more on average than males.

iii. For a ﬁxed value of IQ and GPA, males earn more on average than females provided that the GPA is high enough.

iv. For a ﬁxed value of IQ and GPA, females earn more on average than males provided that the GPA is high enough.

**(b)** Predict the salary of a female with IQ of 110 and a GPA of 4.0.

**(c)** True or false: Since the coeﬃcient for the GPA/IQ interaction term is very small, there is very little evidence of an interaction eﬀect. Justify your answer.

Chapter 3, page 123

**2.** This question should be answered using the Carseats data set. Use R to model the data.

**(a)** Fit a multiple regression model to predict Sales using Price, Urban, and US.

**(b)** Provide an interpretation of each coeﬃcient in the model. Be careful—some of the variables in the model are qualitative!

**(c)** Write out the model in equation form, being careful to handle the qualitative variables properly.

**(d)** For which of the predictors can you reject the null hypothesis H0: βj = 0?

**(e)** On the basis of your response to the previous question, ﬁt a smaller model that only uses the predictors for which there is evidence of association with the outcome.

**(f)** How well do the models in (a) and (e) ﬁt the data?

Note: No need to answer (g) and (h)