

3. Suppose we have a data set with five predictors,  $X_1 = \text{GPA}$ ,  $X_2 = \text{IQ}$ ,  $X_3 = \text{Level}$  (1 for College and 0 for High School),  $X_4 = \text{Interaction between GPA and IQ}$ , and  $X_5 = \text{Interaction between GPA and Level}$ . The response is starting salary after graduation (in thousands of dollars). Suppose we use least squares to fit the model, and get  $\hat{\beta}_0 = 50$ ,  $\hat{\beta}_1 = 20$ ,  $\hat{\beta}_2 = 0.07$ ,  $\hat{\beta}_3 = 35$ ,  $\hat{\beta}_4 = 0.01$ ,  $\hat{\beta}_5 = -10$ .

(a) Which answer is correct, and why?

- i. For a fixed value of IQ and GPA, high school graduates earn more, on average, than college graduates.

- ii. For a fixed value of IQ and GPA, college graduates earn more, on average, than high school graduates.
- iii. For a fixed value of IQ and GPA, high school graduates earn more, on average, than college graduates provided that the GPA is high enough.
- iv. For a fixed value of IQ and GPA, college graduates earn more, on average, than high school graduates provided that the GPA is high enough.

(b) Predict the salary of a college graduate 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.