Quiz 3

7 questions

1.

Consider the `mtcars` data set. Fit a model with mpg as the outcome that includes number of cylinders as a factor variable and weight as confounder. Give the adjusted estimate for the expected change in mpg comparing 8 cylinders to 4.

○ 33.991

○ -6.071

○ -4.256

○ -3.206

2.

Consider the `mtcars` data set. Fit a model with mpg as the outcome that includes number of cylinders as a factor variable and weight as a possible confounding variable. Compare the effect of 8 versus 4 cylinders on mpg for the adjusted and unadjusted by weight models. Here, adjusted means including the weight variable as a term in the regression model and unadjusted means the model without weight included. What can be said about the effect comparing 8 and 4 cylinders after looking at models with and without weight included?.

○ Within a given weight, 8 cylinder vehicles have an expected 12 mpg drop in fuel efficiency.

○ Holding weight constant, cylinder appears to have more of an impact on mpg than if weight is disregarded.

○ Including or excluding weight does not appear to change anything regarding the estimated impact of number of cylinders on mpg.

○ Holding weight constant, cylinder appears to have less of an impact on mpg than if weight is disregarded.

3.

Consider the `mtcars` data set. Fit a model with mpg as the outcome that considers number of cylinders as a factor variable and weight as confounder. Now fit a second model with mpg as the outcome model that considers the interaction between number of cylinders (as a factor variable) and weight. Give the P-value for the likelihood ratio test comparing the two models and suggest a model using 0.05 as a type I error rate significance benchmark.

○ The P-value is small (less than 0.05). So, according to our criterion, we reject, which suggests that the interaction term is necessary

○ The P-value is small (less than 0.05). So, according to our criterion, we reject, which suggests that the interaction term is not necessary.

○ The P-value is small (less than 0.05). Thus it is surely true that there is no interaction term in the true model.

○ The P-value is larger than 0.05. So, according to our criterion, we would fail to reject, which suggests that the interaction terms is necessary.

○ The P-value is larger than 0.05. So, according to our criterion, we would fail to reject, which suggests that the interaction terms may not be necessary.

○ The P-value is small (less than 0.05). Thus it is surely true that there is an interaction term in the true model.

4.

Consider the `mtcars` data set. Fit a model with mpg as the outcome that includes number of cylinders as a factor variable and weight inlcuded in the model as

```
lm(mpg ~ I(wt * 0.5) + factor(cyl), data = mtcars)
```

How is the wt coefficient interpretted?

○ The estimated expected change in MPG per one ton increase in weight.

○ The estimated expected change in MPG per half ton increase in weight.

○ The estimated expected change in MPG per half ton increase in weight for for a specific number of cylinders (4, 6, 8).

○ The estimated expected change in MPG per half ton increase in weight for the average number of cylinders.

○ The estimated expected change in MPG per one ton increase in weight for a specific number of cylinders (4, 6, 8).

5.

Consider the following data set

```
x <- c(0.586, 0.166, -0.042, -0.614, 11.72)
y <- c(0.549, -0.026, -0.127, -0.751, 1.344)
```

Give the hat diagonal for the most influential point

○ 0.9946

○ 0.2025

○ 0.2287

○ 0.2804

6.

Consider the following data set

```
x <- c(0.586, 0.166, -0.042, -0.614, 11.72)
y <- c(0.549, -0.026, -0.127, -0.751, 1.344)
```

Give the slope dfbeta for the point with the highest hat value.

○ -134

○ -.00134

○ -0.378

○ 0.673

7.

Consider a regression relationship between Y and X with and without adjustment for a third variable Z. Which of the following is true about comparing the regression coefficient between Y and X with and without adjustment for Z.

○ For the the coefficient to change sign, there must be a significant interaction term.

○ Adjusting for another variable can only attenuate the coefficient toward zero. It can't materially change sign.

○ It is possible for the coefficient to reverse sign after adjustment. For example, it can be strongly significant and positive before adjustment and strongly significant and negative after adjustment.

○ The coefficient can't change sign after adjustment, except for slight numerical pathological cases.

7 questions unanswered

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