STAT 213 Quiz 7 **Name:** _____
11/21/2024

You have been working with mtcats dataset, and we will continue thinking about cars for this quiz. For the purpose of this quiz, we are going to consider a model below.

$$mpg = \beta_0 + \beta_1 wt + \beta_2 hp + \beta_3 disp + \epsilon \text{ where } \epsilon \sim N(0, \sigma_\epsilon)$$

Problem 1. (3 points) Using the R output below, fill in the empty cells of the provided ANOVA table. Hint: $MS = SS/df$.

```
> dim(mtcars)
[1] 32 11
```

Source	df	SS	MS	F	p value
Model		931.06		44.566	≈ 0
Error		194.99		x	x
Total		1126.05	x	x	x

Problem 2. (3 points) State the hypotheses associated with the test addressed by the ANOVA table.

Problem 3. (6 points) We are extending our regression model to include a new indicator variable vsIND. The variable is defined as follows:

- vsIND = 0 if the engine is V shaped.
- vsIND = 1 if the engine is straight.

The new models is:

$$mpg = \beta_0 + \beta_1 wt + \beta_2 hp + \beta_3 disp + \beta_4 vsIND\epsilon \text{ where } \epsilon \sim N(0, \sigma_\epsilon)$$

a) What is the baseline? (Circle one) v-shaped or straight

b) Using the following model summary output, write down the least squares regression line for

V shaped:

Straight:

```
Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) 37.090733   2.108854  17.588 2.58e-16 ***
wt          -4.015633   1.085529  -3.699 0.000975 ***
hp          -0.026748   0.012206  -2.191 0.037228 *
disp         0.002989   0.011025   0.271 0.788334
vsIND       -1.505746   1.467071  -1.026 0.313829
```