Stat 103 – Due 4-10-20 Quiz 7 Austin Wilson

Instructions**:** You are going to do a regression analysis on data in this quiz, and then do an analysis of variance on the same data in Quiz 8 and compare the two analyses. Make sure you have saved your work for this quiz to facilitate your work on Quiz 8.

The file *Lightbulb* contains the lifetimes of 7 lightbulbs for each of 4 brands: GE, West, Dot, and a generic. In this quiz you are going to run a regression of the variable *Hours* (the lifetime of a lightbulb, in thousands of hours) against the brand. Although this analysis might more naturally be done as a one-way analysis of variance, it is instructive to run it as a regression.

1. The data contains the quantitative response variable Hours, and the single qualitative (or categorical) variable *Brand*.
2. Briefly explain how a regression analysis can be conducted with the categorical variable *Brand*. (Please keep your explanation to two or three sentences. They’ll be opportunities later to provide the details.)

We can create dummy variables for the different brands. We will add three dummy variables and the original variable will represent the fourth of the three brands.

1. What are the hypotheses of the test of the model for the lightbulbs data? Be as specific as the problem allows (I don’t want generic hypotheses for generic regressions.)

H0: There is no difference in hours of lifetime for the different brands.

HA: At least one of the brands lasts a different amount of time than the others.

Run a regression analysis on the full model. (Don’t attempt to find a better model, you’re not being graded on having the best model and any changes to the original model will complicate the comparison you are going to do in Quiz 8.)

1. Report the *F-Ratio* and *P*-value of the full model for the hypothesis test described in part (b).

F:15.62, p-value: 7.599e-6

1. Write out the equation of the full model.

Hours = 2.1-.1\*Dot + .23571\*GE - .31286\* West

1. Use the model to estimate the mean lifetimes of each of the four brands. I want the point estimates, not confidence intervals.

Dot = 2000 hours

GE = 2335.71 hours

West = 1787.14 hours

Generic = 2100 hours

1. Copy the ANOVA table and paste it into the end of the quiz or attach it at the end. You’ll need it to make the comparisons in Quiz 8.

A close up of a keyboard

Description automatically generated

\*\*I have not included the code for these, please let me know if you want me to show the code