**Quiz BF[2] – Using Software**

Part I – Individual Quiz (Before Class)

Part II – Group Quiz (During Class)

1. What is an interaction plot? When does an interaction plot show that we have an interaction (2 pts)?

An interaction plot is a plot that is used to determine the possible interaction amongst variables in a given data set. This allows us to be aware of and make note of any interactions that might be present in the data. By using these plots, we are able to include specific variables into our models and then account for them in our analysis.

**End of Part I**

1. Were you in class on time (2 pts)?

Yes

1. Get interaction plots, means plots, and boxplots with the Wear Data using R and evaluate graphs (8 pts).

NUMERIC DESCRIPTIVE STATISTICS

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wear$prop min Q1 median Q3 max mean sd n missing

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1 137 150.5 157.5 163.2 173 156.2 14.91 4 0

2 98 121.2 153 182.2 198 150.5 45.38 4 0

3 132 149.2 192 230.5 235 187.8 52.01 4 0

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wear$filler min Q1 median Q3 max mean sd n missing

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1 155 174 187.5 221.2 235 194.5 32.16 6 0

2 98 129.8 134.5 150.5 160 135.2 22.1 6 0

The numeric descriptions show us that the means are different and that there is also a difference in the quartiles between tht efirst three groups under the prop variable. Also it shows us that there is also quite a difference in the filler categories that are respresented.

BOXPLOTS : Wear1 on Prop



Wear1 on Filler



The boxplots are a visualization of the numeric values that we just looked at. They show us that there is a difference between at least one of the groups when we are considering what is being looked at.

TRANSFORMATION PLOTS





These two graphics show us that we could use a transformation. I do not understand transformations as much as I would like, but when we do not see the lines being parallel, that suggests that a transformation would be useful.

MEAN PLOTS





The mean plots are able to show us that the groups are different when looking at strictly numeric values.

1. Get an ANOVA table from R with the Wear Data and Interpret the Results (6 points).

&nbsp; Df Sum Sq Mean Sq F value Pr(>F)

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\*\*prop\*\* 2 3217 1609 6.845 0.0283

\*\*filler\*\* 1 10561 10561 44.94 0.0005349

\*\*prop:filler\*\* 2 2987 1494 6.356 0.03297

\*\*Residuals\*\* 6 1410 235



Given the results from the test and the plots that show whether we have equal variance and normality. I question that the data is normal, considering the two tails and how the make their way away from the straight line that we are referencing. Also, the variance does not look good. We see that the groupings are not equally spread and that they come into a megaphone shape, which means that there is a trend. If we move forward and accept the results obtained from the test, then we are able to see that each of the factors has significant impact on the wear1 response variable, given that all other variables are held at a constant.

1. Do a transformation of the wear data and interpret the results (4 points)

Df Sum Sq Mean Sq F value Pr(>F)

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\*\*prop\*\* 2 0.1085 0.05427 4.321 0.06882

\*\*filler\*\* 1 0.399 0.399 31.77 0.001336

\*\*prop:filler\*\* 2 0.1048 0.05242 4.173 0.07316

\*\*Residuals\*\* 6 0.07537 0.01256



With the data that was given I tried to run a few different transformations to try to account for the lack of normality and the issue in variance. The log transformation helped with finding normality, or controlling for it, but it made the variance a little more extreme. It also made the p-values of the interaction and the prop variable less than significant. Given that, the variance has been minimized and a better transformation would be more appropriate.