STAT 614 HOMEWORK TWO WAY ANOVA and LOGISTIC REGRESSION

TWO WAY ANOVA

**Oil Change** The following data represent the cost of an oil change (in dollars) for three different geographic regions for two types of service centers. A specialty chain is an oil change facility that specializes in oil changes, while a general service station provides a wide array of services in addition to oil changes.

Service Center Location

|  |  |  |  |
| --- | --- | --- | --- |
|  | Chicago | Bolingbrook | Peoria |
|  | 19.95 | 23.99 | 24.99 |
| Specialty chain | 27.95 | 29.95 | 26.99 |
|  | 23.99 | 28.99 | 19.95 |
|  | 21.99 | 22.45 | 22.99 |
| General service | 26.95 | 29.95 | 24.95 |
|  | 24.95 | 28.13 | 27.99 |
|  |  |  |  |

Assume that the conditions to execute a Two Way ANOVA test have been satisfied.

1) What two factors have a possible impact on the cost of an oil change?

2) Prepare the data for R input. Initial rows and columns have been done for you. Complete the table.

**ServiceCenter Location OilChangeCharge**

SecialtyChain Chicago 19.95

SecialtyChain Chicago 27.95

SecialtyChain Chicago 23.99

SecialtyChain Bolingbrook 23.99

SecialtyChain Bolingbrook 29.95

SecialtyChain Bolingbrook 28.99

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3) Use and show R code to formally convert the character variables to factors.

4) Use and show R code to produce a Two Way ANOVA Table

5) Does your ANOVA table indicate that there is interaction for the explanatory factor variables? Justify your answer.

6) Use and show R code to produce an interaction plot. Provide an interpretation of your interaction plot.

7) Should the null hypothesis be rejected for your individual factors? Justify your answers.

LOGISTIC REGRESSION (Use the **updated** notes and code posted on blackboard)

8) Use the built in R data set **mtcars** to find the probability that a vehicle that has a weight(**wt)** of 3.3 and a displacement (**disp**) of 200 will have an engine type that is straight. (In the **mtcars** data table the variable **vs** pertains to engine type: 1 = straight, 0 = V shaped). Use the R code and logistic regression procedures illustrated in the notes. SHOW ALL OF YOUR WORK.