STAA 553: HW2

YOUR NAME HERE

See Canvas Calendar for due date.
40 points total, 2 points per problem unless otherwise noted.
Add or delete code chunks as needed.
Content for most questions is from Section 03 or earlier.
Unadjusted pairwise comparisons (Q6) is discussed in Section 04.

Weight Loss (Q1 - Q7)

Ott & Longnecker describe a weight loss study with g = 5 treatments (C, T1, T2, T3, T4). Trt C represents a "control" treatment. The response variable is weight loss (in pounds). A total of 50 (human) subjects were randomly assigned to treatments such that there are n = 10 subjects per treatment. The data is available from Canvas as WtLoss.csv.

Q1 (3 pts)

Calculate a table of summary statistics including sample size, mean, sd by Trt group.

Q2

Create an appropriate summary plot of the data.

Q3

Fit an appropriate one-way model with default contrasts.

Q3A

Show the design matrix.

Q3B

Show the coefficient (or parameter) estimates.

Q3C (5 pts)

Use the coefficient (or parameter) estimates to calculate the predicted mean for each of the treatments. Notes: You must show your work to get full credit for this question. Use echo = TRUE to show your work for this question.

```
#Q3C
#C

#T1

#T2

#T3

#T4
```

Q4

Now consider the diagnostic plots.

Q4A

Show the plots of Residuals vs Fitted values and QQplot of residuals

Q4B

Using a plot from above, briefly discuss whether the assumption of **equal variance** is satisfied. Note: In your discussion, make it clear what plot you are using to evaluate this assumption.

Response

Q4C

Using a plot from above, briefly discuss whether the assumption of **normality** is satisfied. Note: In your discussion, make it clear what plot you are using to evaluate this assumption.

Response

Q5

Provide an appropriate one-way ANOVA table.

Q5A

Show the ANOVA table.

Q5B

State the null hypothesis corresponding to the F-test. Be specific.

Response

Q5C

Make a conclusion for the F-test **in context**.

Response

Q6

Use the emmeans package to calculate the following.

Q6A

Show the emmeans (estimated marginal means).

Q6B

Show the unadjusted pairwise comparisons. Hint: Use adjust = "none".

Q6C (4 pts)

Using the result from the previous question, briefly summarize your conclusions **in context** using alpha = 0.05. Note: it may be easier to discuss which comparisons do NOT show evidence of differences.

Response

Q7

Now refit the one-way model using one "alternate" parameterization from Section 03 notes or example. Use echo = TRUE to show your work for this question.

Q7A

Show the coefficient (or parameter) estimates.

```
#Q7A
```

Q7B

Use the predict() function to calculate the model based predicted means. Note: These predicted means should (exactly) match the "simple" means from Q1 and the emmeans from Q6A.

Appendix

```
#Retain this code chunk!!!
library(knitr)
knitr::opts_chunk$set(echo = FALSE)
knitr::opts_chunk$set(message = FALSE)
knitr::opts_chunk$set(warning = FALSE)
#Q1

#Q2

#Q3A

#Q3B

#Q3C
#C

#T1

#T2

#T3

#T4

#Q4
par(mfrow = c(1,2))

#Q5

#Q6A

#Q6B

#Q7A
```

```
#Q7B
```