Problem Set #4
Miscellaneous Practice Questions

Initialize R by entering the following commands at the prompt. You must type the commands exactly as shown.

```r
> options(contrasts=c("contr.sum","contr.poly"))  # set definition of contrasts
> q1.data <- read.csv(file=url("http://psycserv.mcmaster.ca/bennett/psy710/p1/q1Data.csv") )
```

An experiment was conducted to assess the effects of four treatments on a dependent variable, y. The experiment measured y on 32 subjects randomly to the four treatments (n = 8 per treatment), and the data are stored in the data frame q1.data. Use q1.data to answer all of the following questions.

1. Calculate the mean and standard deviation of y for each treatment group.
2. Conduct an analysis of variance to evaluate the effect of treatment on y. Record the results of your ANOVA (i.e., write the ANOVA table).
3. Explain the null and alternative hypotheses that are evaluated by your ANOVA.
4. Explain what is meant by Type I and Type II errors and how they relate to your analysis.
6. Evaluate a linear comparison between the mean of treatment 1 and the mean of the other three treatments.
7. Assume that you decided to perform the previous contrast after looking at the data. How would your statistical test change? Perform that statistical test.
8. List a set of weights that could be used to evaluate a linear contrast that is orthogonal to the contrast tested in the previous two questions.
9. Evaluate all pairwise differences between groups. Make sure the assumptions of your test are valid.