

## Assignment 4

Paul Gribble  
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due: Feb 14, 2019

### One-Way ANOVA

The .csv file called `migraine.csv` contains 27 pain ratings collected from migraine sufferers following the ingestion of one of three drugs after the onset of migraine (drug A, B, or C). Pain ratings are on a scale of 1 (least pain) to 10 (most pain).

Load the data into R like so:

```
fname <- "https://www.gribblelab.org/stats2019/data/migraine.csv"
migraine <- read.table(fname, sep=",", header=TRUE)
```

1. Generate some kind of graphical display of the data. It's up to you what kind. Label the axes and give the Figure a title. (1 point)
2. Perform a one-way ANOVA to determine if there is evidence that pain is affected by drug. (1 point) You can use the following commands in R if you like:

```
m1 <- aov(pain ~ drug, data=migraine)
summary(m1)
```

3. Test the homogeneity of variance assumption and test the normality assumption. (1 point each)
4. The omnibus F test in the ANOVA is significant, ( $F(2,24)=11.91$ ,  $p<0.0003$ ). Perform follow-up tests to determine where the differences are reliable. Assume you haven't planned any comparisons in advance. Conduct all possible pairwise tests and be sure to apply an adjustment for Type-I error. Explain why you chose your particular adjustment. Hint: the `TukeyHSD` function in R can be applied to the output of the `aov` function, which in the above code, is the variable called `m1`. (2 points)
5. On the basis of your analysis, what can you conclude about each drug's effect on migraine pain? (1 point)