One-way ANOVA

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This R Markdown file shows how to perform a one-way ANOVA in R and then make a bar graph using ggplot2.

Load packages.

```r
library(dplyr)
library(ggplot2)
```

Read in the data.

```r
df1 = read.csv('df1.csv')
```

Using a dataframe of synthetic data with two columns (treatment and outcome), perform a one-way ANOVA.

```r
anova1 = aov(outcome ~ treatment, data = df1)
summary(anova1)
```

```
##             Df Sum Sq Mean Sq F value Pr(>F)
## treatment    2  1.651  0.8254   3.886 0.0238 *
## Residuals   96 20.390  0.2124
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Perform Tukey's HSD post-hoc test for multiple comparisons.

```r
tukey1 <- TukeyHSD(anova1)
tukey1
```

```
##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = outcome ~ treatment, data = df1)
##
## $treatment
##           diff         lwr        upr      p adj
## b-a -0.1976610 -0.4677578 0.07243577 0.1949499
## c-a  0.1150264 -0.1550704 0.38512315 0.5699794
## c-b  0.3126874  0.0425906 0.58278415 0.0190209
```

Groups b and c are significantly different (padj < .05).

Calculate the average outcome for each treatment.

```
ave1 = df1 %>%
  group_by(treatment) %>%
  summarize(mean(outcome),
            sem = sd(outcome) / sqrt(n()))

colnames(ave1)[2] = 'outcome'
```

Make a bar graph using ggplot2.

```
plot1 = ggplot(ave1, aes(x = treatment, y = outcome)) +
  geom_col() +
  geom_errorbar(aes(ymin = outcome - sem, ymax = outcome + sem), width = 0.2) +
  xlab('Treatment') +
  ylab('Outcome')

plot1
```