Statistical Inference Course Project Part 2

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2018/4/21

Part 2: Basic Inferential Data Analysis Instructions

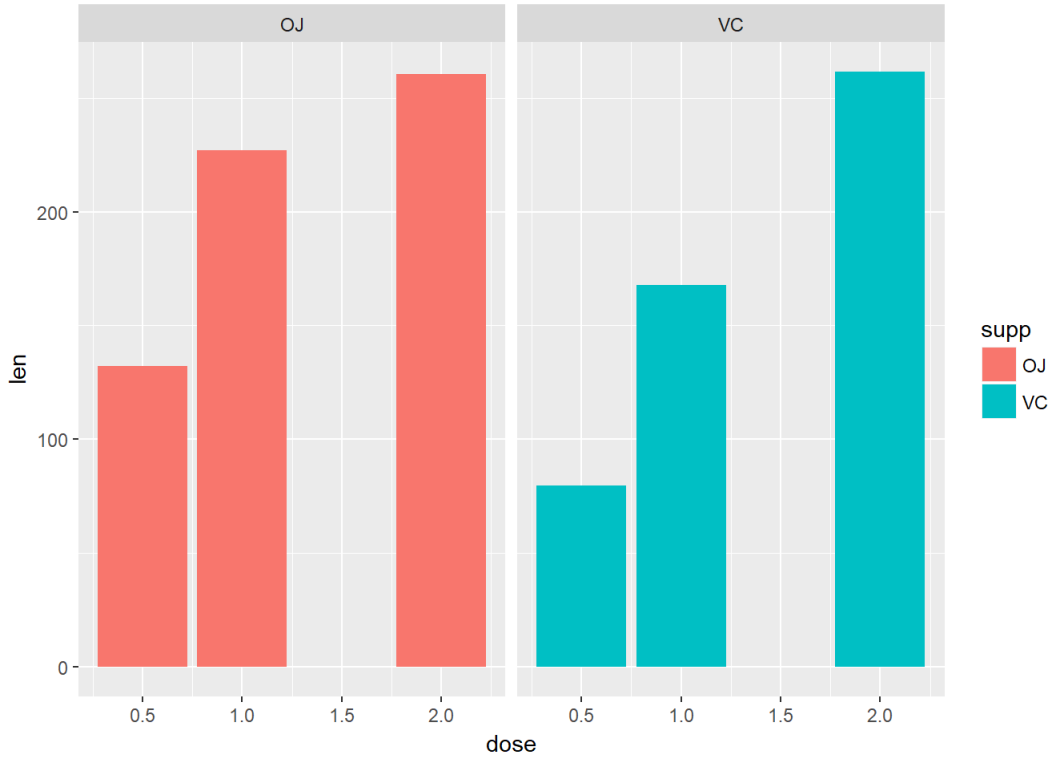
Now in the second portion of the project, we're going to analyze the ToothGrowth data in the R datasets package.

```
## 'data.frame':    60 obs. of  3 variables:
##  $ len : num  4.2 11.5 7.3 5.8 6.4 10 11.2 11.2 5.2 7 ...
##  $ supp: Factor w/ 2 levels "OJ","VC": 2 2 2 2 2 2 2 2 2 2 ...
##  $ dose: num  0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 ...
```

```
##       len        supp         dose
##  Min.   : 4.20   OJ:30   Min.   :0.500
##  1st Qu.:13.07   VC:30   1st Qu.:0.500
##  Median :19.25           Median :1.000
##  Mean   :18.81           Mean   :1.167
##  3rd Qu.:25.27           3rd Qu.:2.000
##  Max.   :33.90           Max.   :2.000
```

From the summary function and the plot, we can find that the tooth growth length is increasing as dosage increasing. The two kind of supplements-OJ and VC, looks have similar effects when dosage is 2.

```
g <- ggplot(data,aes(x=dose, y=len))
g <- g + facet_grid(.~ data$supp)
g <- g + geom_bar(stat = "identity",aes(fill=supp))
g
```



Use confidence intervals and/or hypothesis tests to compare tooth growth by supp and dose.

We assume that OJ and VC have the same effect on tooth growth.

```
#Hypothesis
h1 <- t.test(len ~ supp, data=subset(data,dose==0.5))
h1
```

```
##
##  Welch Two Sample t-test
##
## data:  len by supp
## t = 3.1697, df = 14.969, p-value = 0.006359
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  1.719057 8.780943
## sample estimates:
## mean in group OJ mean in group VC
##            13.23             7.98
```

```
p1 <- h1$p.value
h2 <- t.test(len ~ supp, data=subset(data,dose==1.0))
h2
```

```
##
##  Welch Two Sample t-test
##
## data:  len by supp
## t = 4.0328, df = 15.358, p-value = 0.001038
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2.802148 9.057852
## sample estimates:
## mean in group OJ mean in group VC
##            22.70            16.77
```

```
p2 <- h2$p.value
h3 <- t.test(len ~ supp, data=subset(data,dose==2.0))
h3
```

```
##
##  Welch Two Sample t-test
##
## data:  len by supp
## t = -0.046136, df = 14.04, p-value = 0.9639
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -3.79807  3.63807
## sample estimates:
## mean in group OJ mean in group VC
##            26.06            26.14
```

```
p3 <- h3$p.value
rp1 <- round(p1,3)
rp2 <- round(p2,3)
rp3 <- round(p3,3)
data.frame(rp1,rp2,rp3)
```

rp1 <dbl>
0.006

1 row | 1-1 of 3 columns

Conclustions

As the hypothesis part show, the confidence interval is 95%, and only when the dosage is 2, the p-value is greater than 0.05 threshold. So we can say, the OJ and VC have the same effect only when dosage is 2.0