Assignment Part 2

Introduction

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

Dataset(ToothGrowth): The Effect of Vitamin C on Tooth Growth in Guinea Pigs

Description: The response is the length of odontoblasts (teeth) in each of 10 guinea pigs at each of three dose levels of Vitamin C (0.5, 1, and 2 mg) with each of two delivery methods (orange juice or ascorbic acid).

Format: A data frame with 60 observations on 3 variables.

[,1] len numeric Tooth length [,2] supp factor Supplement type (VC or OJ). [,3] dose numeric Dose in milligrams.
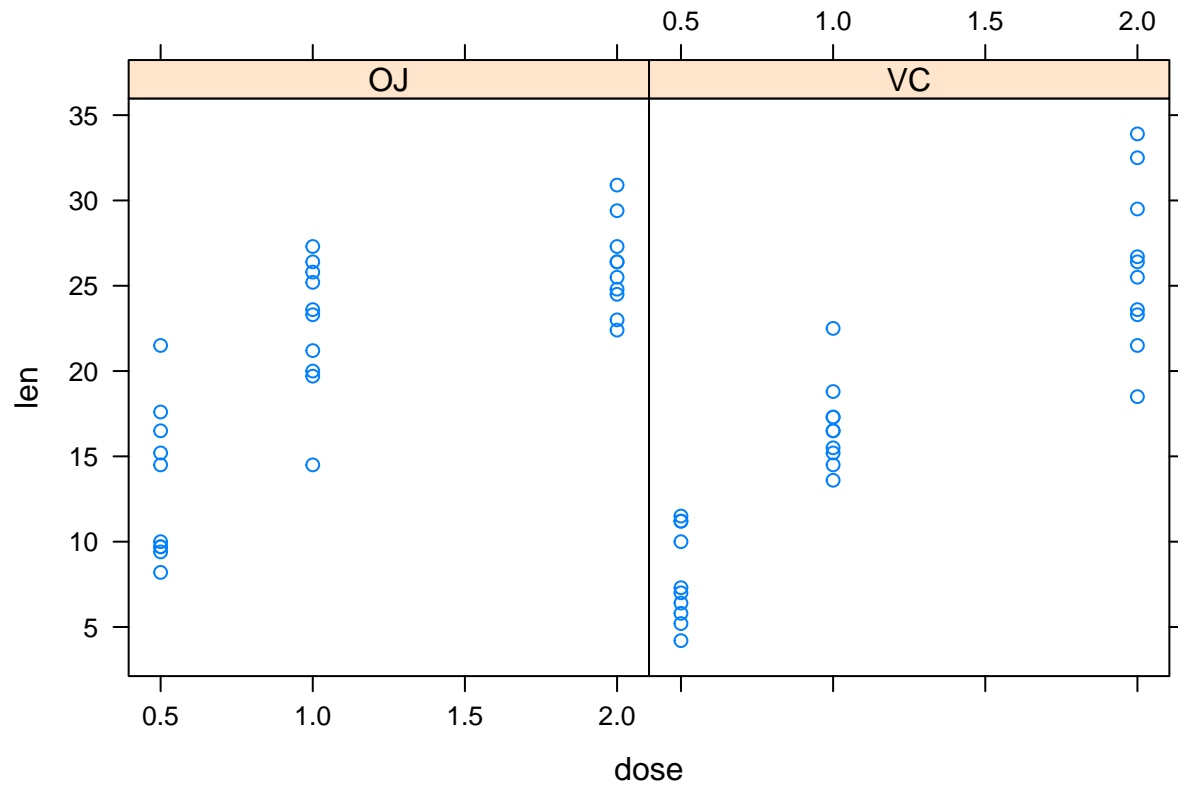
Basic Analysis

First let's try to compare tooth lengths vs. the Vitamin C/orange juice dosage. From the figure, we know that Orange Juice seems to perform better at the 0.5mg dosages, but has a similar result to Vitamin C at the 2.0mg dosage.

```
library(datasets)
data(ToothGrowth)
library(lattice)
histogram(~len|supp, data=ToothGrowth)
```
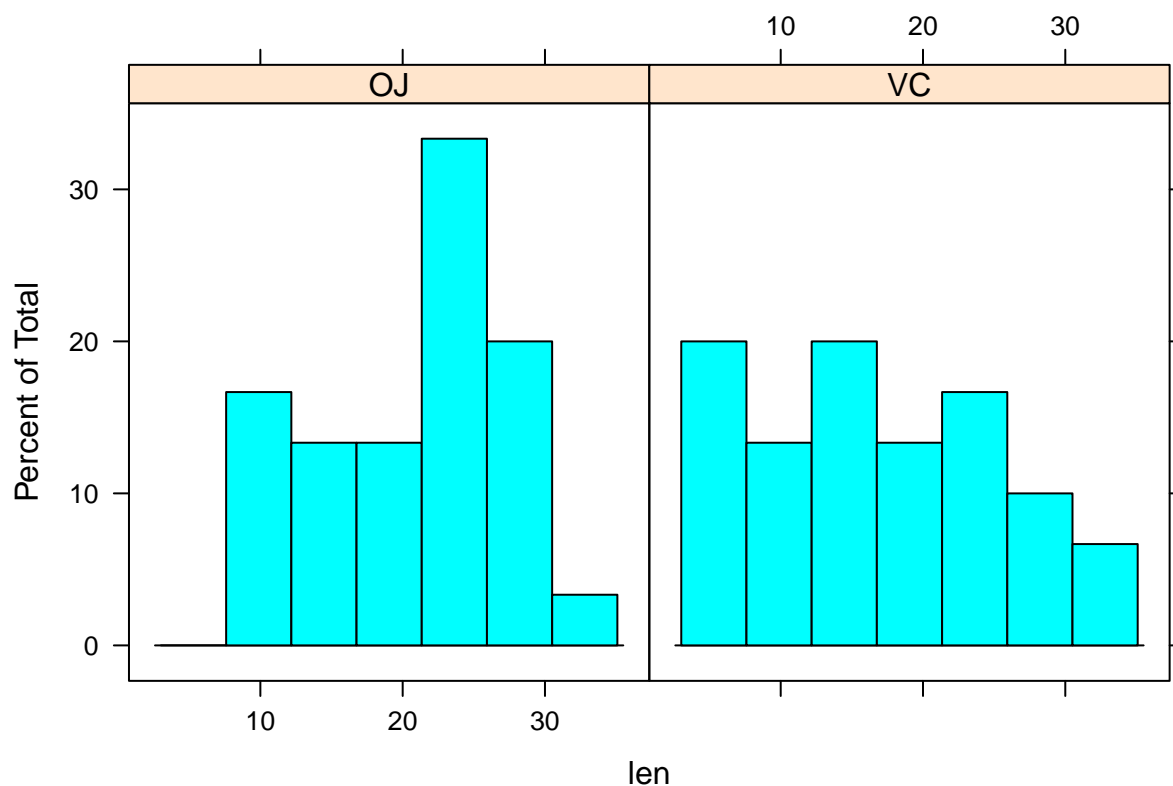
```
xyplot(len~dose|supp, data = ToothGrowth)
```


Basic Summary

The len increase as the doseage increase for both orange juice and Vitamin C. Orange juice has better performance than Vitamin C as the dosage is low.And also a better average performance.

```
meanOJ <- mean(ToothGrowth[ToothGrowth$supp == "OJ",1])
meanOJ
```

```
## [1] 20.66333
```

```
meanVC <- mean(ToothGrowth[ToothGrowth$supp == "VC",1])
meanVC
```

```
## [1] 16.96333
```

Hypothesis

Hypothesis 1: Orange juice and Vitamin C has the same performance.

```
t1 <- t.test(len ~ supp, data=ToothGrowth)
t1$statistic
```

```
##        t
## 1.915268
```

```r
qt(.95,58)
```

```
## [1] 1.671553
```

Hypothesis 2: Orange juice and Vitanmin C has the same performance when the dosage is low

```r
sub <- ToothGrowth[ToothGrowth$dose == .5, ]
t2 <- t.test(len ~ supp, data=sub)
t2$statistic
```

```
##        t
## 3.169733
```

```r
qt(.95,dim(sub)[1] -2)
```

```
## [1] 1.734064
```

Conclusions for

H1 fails: since 1.9152683 is above 1.6715528

H2 fails: since 3.1697328 is above 1.7340636