Statistical Inference Assigment2

Load the ToothGrowth data and perform some basic exploratory data analyses

```
library(datasets)
str(ToothGrowth)
```

```
## '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 ...
```

```
head(ToothGrowth)
```

```
##    len supp dose
## 1  4.2   VC  0.5
## 2 11.5   VC  0.5
## 3  7.3   VC  0.5
## 4  5.8   VC  0.5
## 5  6.4   VC  0.5
## 6 10.0   VC  0.5
```

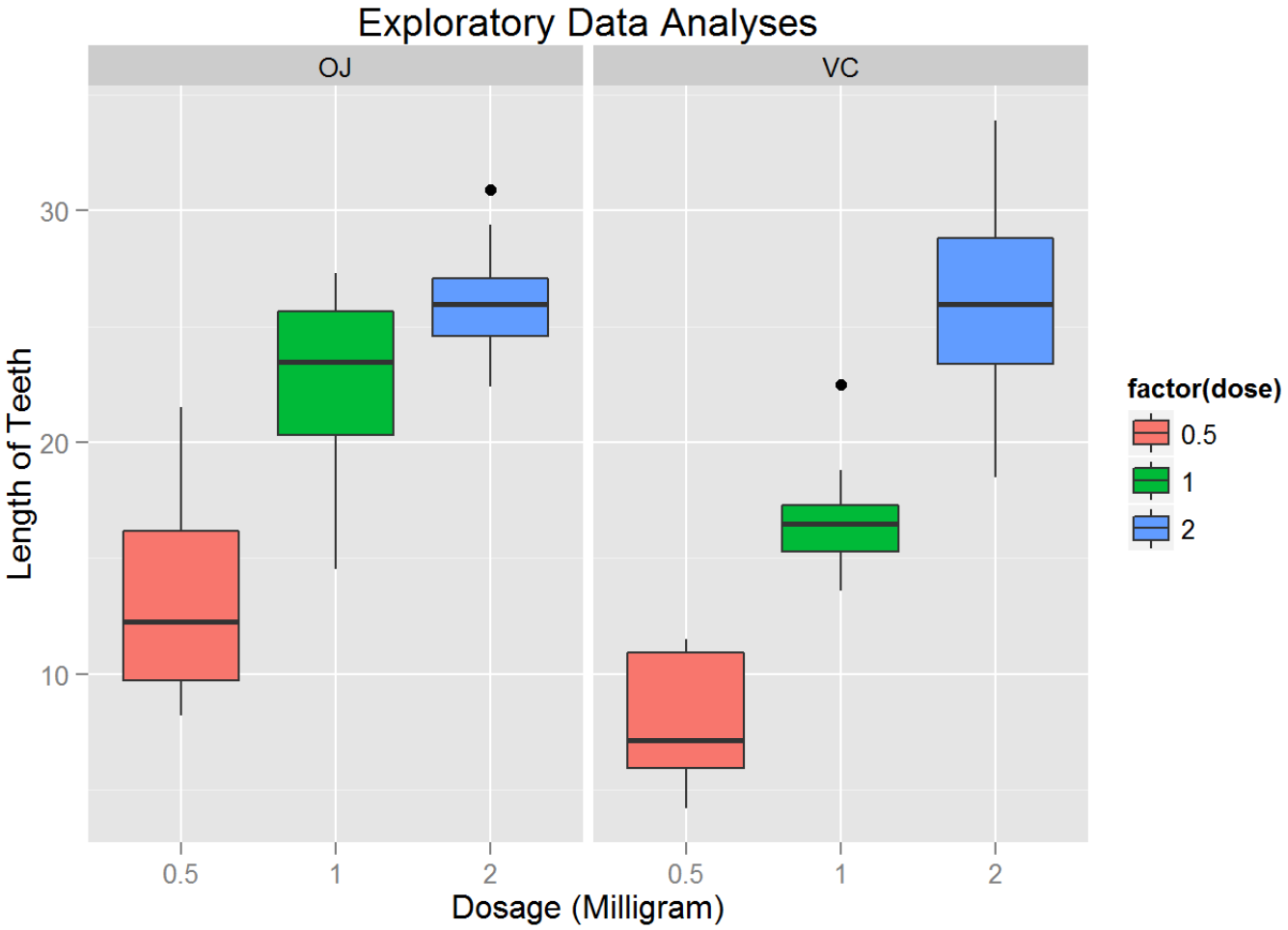
```
#the summary of the data
ToothGrowth$dose <- as.factor(ToothGrowth$dose)
summary(ToothGrowth)
```

```
##       len        supp     dose
##  Min.   : 4.20   OJ:30   0.5:20
##  1st Qu.:13.07   VC:30   1  :20
##  Median :19.25           2  :20
##  Mean   :18.81
##  3rd Qu.:25.27
##  Max.   :33.90
```

```
table(ToothGrowth$supp, ToothGrowth$dose)
```

```
##
##      0.5  1  2
##   OJ  10 10 10
##   VC  10 10 10
```

```
library(ggplot2)
plot <- ggplot(ToothGrowth,
               aes(x=factor(dose),y=len,fill=factor(dose)))
plot + geom_boxplot(notch=F) + facet_grid(.~supp) +
     scale_x_discrete("Dosage (Milligram)") +
     scale_y_continuous("Length of Teeth") +
     ggtitle("Exploratory Data Analyses")
```



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

```
supp.t1 <- t.test(len~supp, paired=F, var.equal=T, data=ToothGrowth)
supp.t2 <- t.test(len~supp, paired=F, var.equal=F, data=ToothGrowth)
supp.result <- data.frame("p-value"=c(supp.t1$p.value, supp.t2$p.value),
                          "Conf-Low"=c(supp.t1$conf[1],supp.t2$conf[1]),
                          "Conf-High"=c(supp.t1$conf[2],supp.t2$conf[2]),
                          row.names=c("Equal Var","Unequal Var"))
supp.result
```

```
##                p.value   Conf.Low Conf.High
## Equal Var   0.06039337 -0.1670064  7.567006
## Unequal Var 0.06063451 -0.1710156  7.571016
```

the assumptions needed for their conclusions

Based on the analysis above, we can conclude that

1, The 2mg dose has larger impact on tooth growth than 1mg and 0.5mg, while 1mg dose has more impact than 0.5mg dose. So there is a different in the growth of the tooth while the doses are larger.

2, There is no doubt that orange juice and vitamin C have obvious different impact on tooth growth.