Basic Inferential Data Analysis of ToothGrowth data using R

Summary

The response is the length of odontoblasts(cells responsible for tooth growth) in 60 guinea pigs. Each animal received one of the three dose levels of vitamin C(0.5,1 and 2 mg/day) by one of tow delivery methods, orange juice or ascorbic acid(a form of vitamin C and coded as VC).

There are 60 observations and 3 variables. Variables are: 1. len: numeric Tooth length 2. supp factor: Supplement type(VC or OJ) 3. dose: numeric Dose in milligrams/day

```
library(UsingR)
```

Dataset

```
data("ToothGrowth")
summary(ToothGrowth)
```

```
##      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
```

Plot of tooth growth vs dose

```
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 3.5.1
```

```
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
```

```
ToothGrowth$sup <- as.character(ToothGrowth$supp)

ToothGrowth$sup[ToothGrowth$sup == "VC"] <- "VitaminC"
ToothGrowth$sup[ToothGrowth$sup == "OJ"] <- "OrangeJuice"

g <- ggplot(ToothGrowth,aes(dose,len))+geom_point(col="red")
g+facet_grid(.~ sup)+scale_x_continuous(name = "Dose (miligram/day)")+scale_y_continu
ous("Length Tooth Growth")+geom_smooth(method = "lm")
```
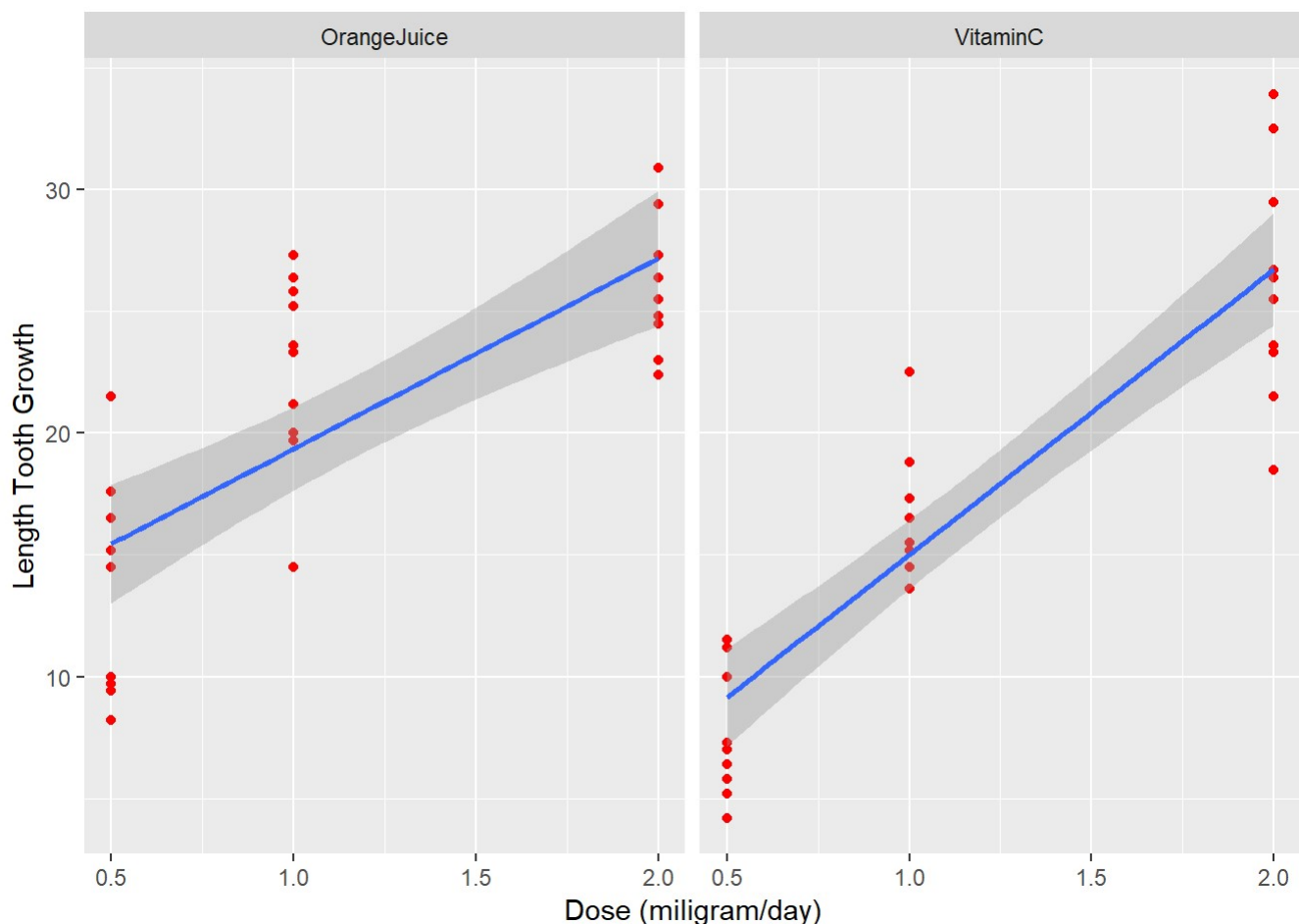

###Summary Form the above graph it can be seen that for both Orange Juice and Vitamin C the tooth growth
increases with the increase in dose.

Mean tooth growth for each dose

```
library(reshape2)
```

```
meandose <- aggregate(len ~ dose,data = ToothGrowth,FUN = mean)
head(meandose)
```

```
##   dose    len
## 1  0.5 10.605
## 2  1.0 19.735
## 3  2.0 26.100
```

Mean tooth growth for each suppliment

```
meansupp <- aggregate(len ~ supp,data = ToothGrowth,FUN = mean)
head(meansupp)
```

```
##   supp      len
## 1   OJ 20.66333
## 2   VC 16.96333
```

Caluculating the confidence intervals for Orange Juice and Vitamin C suppliment

```
orangejuice <- subset(ToothGrowth,ToothGrowth$supp == "OJ")
vitaminC <- subset(ToothGrowth,ToothGrowth$supp == "VC")
t.test(orangejuice$len - vitaminC$len)
```

```
##
##  One Sample t-test
##
## data:  orangejuice$len - vitaminC$len
## t = 3.3026, df = 29, p-value = 0.00255
## alternative hypothesis: true mean is not equal to 0
## 95 percent confidence interval:
##  1.408659 5.991341
## sample estimates:
## mean of x
##       3.7
```

```
g <- ggplot(ToothGrowth, aes(x = supp, y = len, group = factor(dose)))
g <- g + geom_line(size = 1, aes(colour = dose)) + geom_point(size =10, pch = 21, fil
l = "salmon", alpha = .5)
g
```
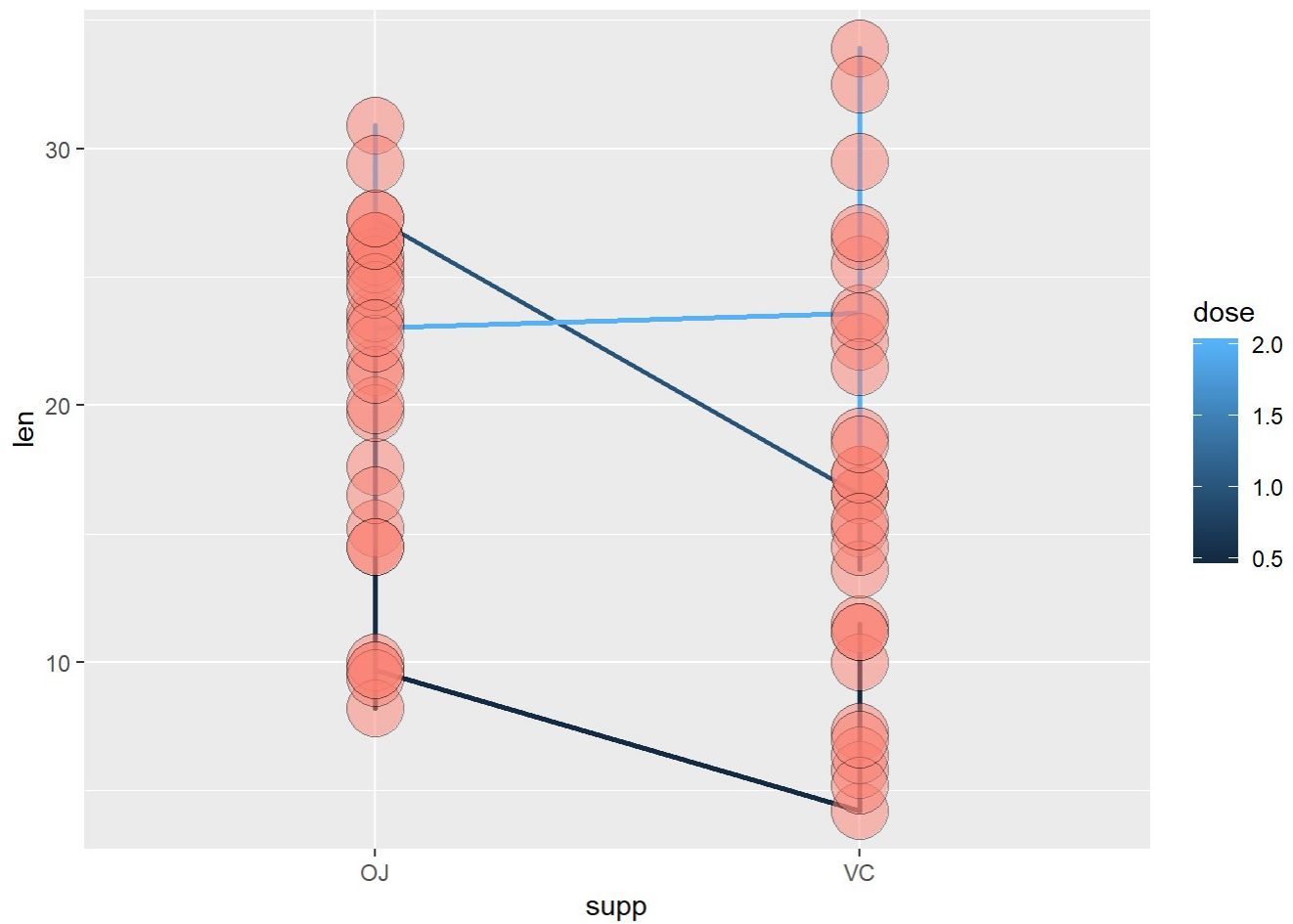
Conclusion:

There seems a net increase in the tooth growth with the increase in the dose in each case where Orange Juice and and Vitamin C is used. Also, the Orange juice seems to perform better than vitamin C for tooth growth