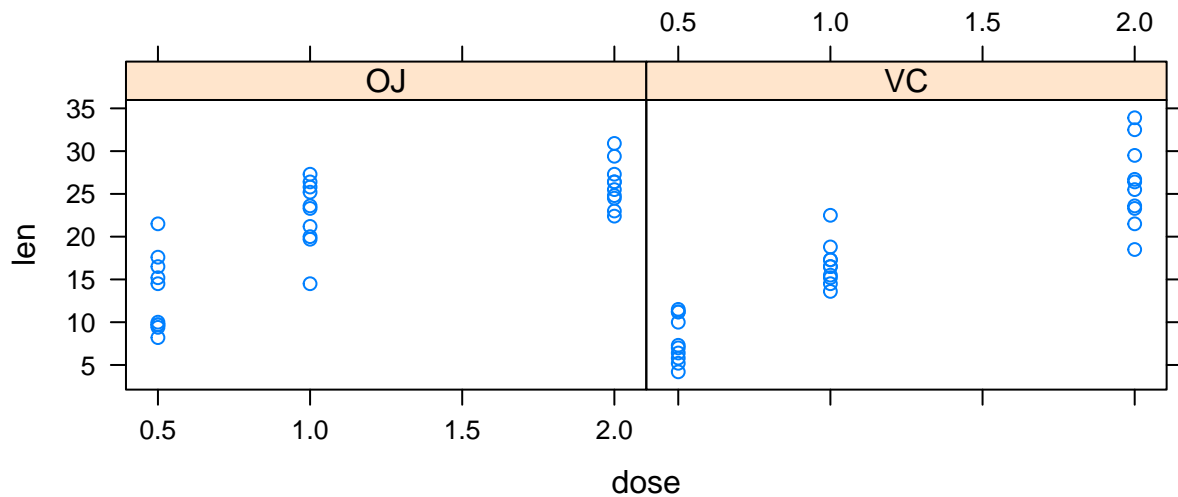


Statistical Inference Assessment Part 2

Question 1

I loaded the ToothGrowth data and perform some basic exploratory data analyses,

```
library(lattice)
data(ToothGrowth)
xyplot(len~dose|supp,data=ToothGrowth,layout=c(2,1))
```



Question 2

A basic summary of the data,

```
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 ...
```

Question 3

Firstly I tested the hypothesis that response of the length of odontoblasts (teeth) in each of 10 guinea pigs is high in case of "VC" as compared to "OJ"

```
#First Hyp., that "VC" has good impact rather than OJ
t.test(ToothGrowth[ToothGrowth$supp=="OJ"],$len-ToothGrowth[ToothGrowth$supp=="VC"],$len)
```

```
##
## One Sample t-test
```

```
##
## data:  ToothGrowth[ToothGrowth$supp == "OJ", ]$len - ToothGrowth[ToothGrowth$supp == "VC", ]$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
```

then, I tested the hypothesis that response of the length of odontoblasts (teeth) in each of 10 guinea pigs is high as dose increases. So firstly I tested dose 0.5 with 1, later I tested dose 1 with 2,

```
#Secon Hyp., that increased dose has good impact.
comp1<-subset(ToothGrowth,dose%in%c(0.5,1))
t.test(len~supp,data=comp1,paired = T)
```

```
##
## Paired t-test
##
## data:  len by supp
## t = 4.6042, df = 19, p-value = 0.0001936
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  3.048852 8.131148
## sample estimates:
## mean of the differences
##      5.59
```

```
comp2<-subset(ToothGrowth,dose%in%c(1,2))
t.test(len~supp,data=comp2,paired = T)
```

```
##
## Paired t-test
##
## data:  len by supp
## t = 2.0463, df = 19, p-value = 0.05482
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.06682146  5.91682146
## sample estimates:
## mean of the differences
##      2.925
```

Question 4

By looking at the above results, it seems that the response of 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) is highly correlated. Higher the dose is, higher is the response of the length of teeths. But that response is quite independent of delivery methods (orange juice or ascorbic acid).