Appendix of Statistical Inference Course Project - Part 2

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Codes

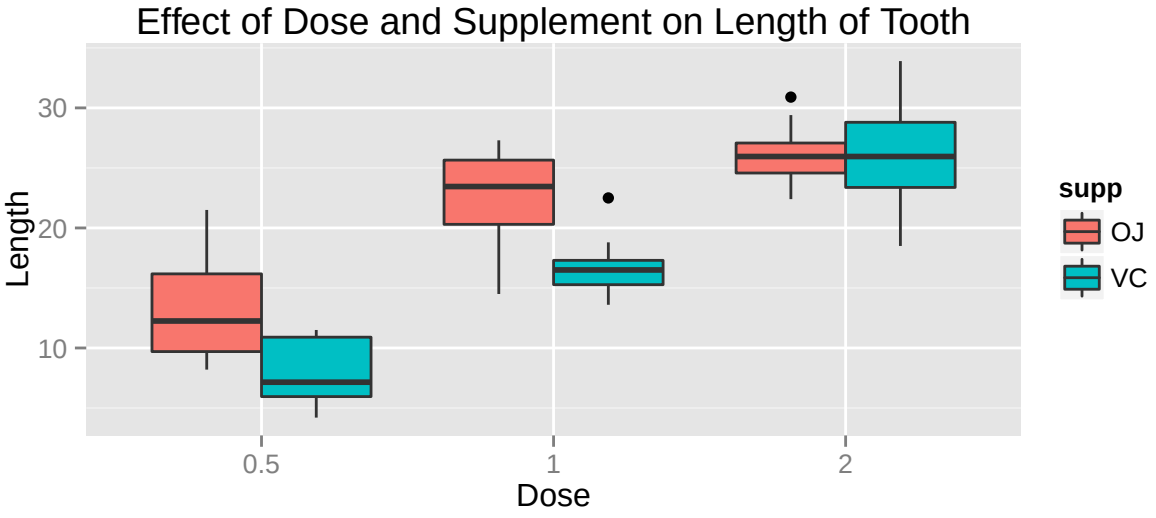
Looking at head of ToothGrow data in step 1

```
data(ToothGrowth)
ToothGrowth$dose <- as.factor(ToothGrowth$dose)
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
```

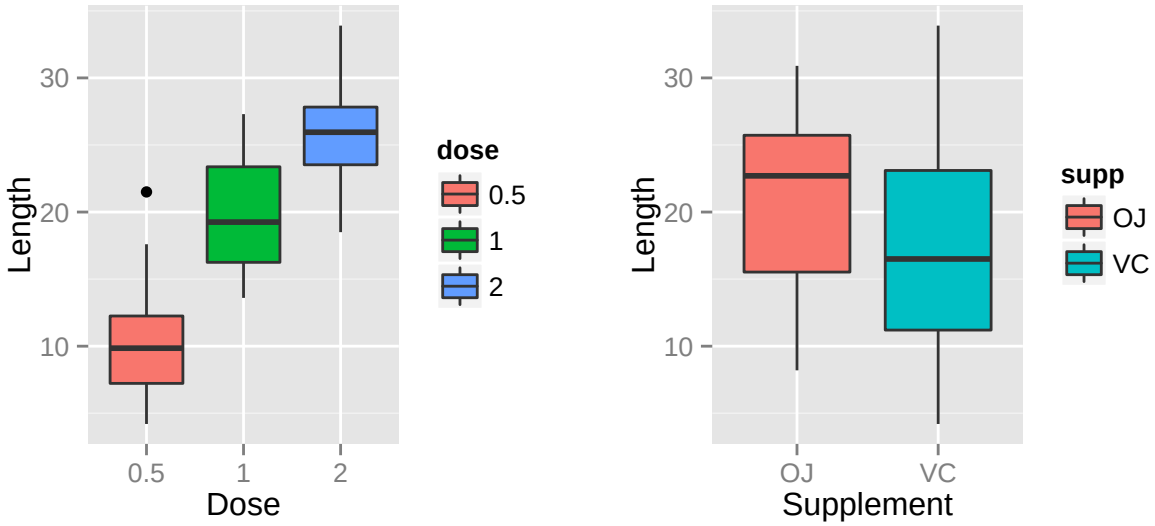
Code of first plot

```
library(ggplot2)
plot2 <- ggplot(ToothGrowth, aes(x = dose, y = len, fill = supp))
plot2 <- plot2 + geom_boxplot()
plot2 <- plot2 + labs(title = "Effect of Dose and Supplement on Length of Tooth", x = "Dose", y = "Leng
plot2
```



Code of second plot

```
suppressMessages(library(gridExtra))
plot2.1 <- ggplot(ToothGrowth, aes(x = dose, y = len, fill = dose))
plot2.1 <- plot2.1 + geom_boxplot(aes(fill = dose))
plot2.1 <- plot2.1 + labs(x = "Dose", y = "Length")
plot2.2 <- ggplot(ToothGrowth, aes(x = supp, y = len, fill = supp))
plot2.2 <- plot2.2 + geom_boxplot(aes(fill = supp))
plot2.2 <- plot2.2 + labs(x = "Supplement", y = "Length")
grid.arrange(plot2.1, plot2.2, ncol = 2)
```



Code of p-values of hypothesis tests for different dose groups

```
suppressMessages(library(dplyr))
toothDose0.5 <- filter(ToothGrowth, dose == 0.5)
toothDose1 <- filter(ToothGrowth, dose == 1)
toothDose2 <- filter(ToothGrowth, dose == 2)
t1.1 <- t.test(toothDose0.5$len, toothDose1$len)
t1.2 <-t.test(toothDose0.5$len, toothDose2$len)
t1.3 <- t.test(toothDose1$len, toothDose2$len)
c("dose0.5-dose1" = t1.1$p.value, "dose0.5-dose2" = t1.2$p.value, "dose1-dose2" = t1.3$p.value)
```

```
## dose0.5-dose1 dose0.5-dose2   dose1-dose2
##  1.268301e-07  4.397525e-14  1.906430e-05
```

Complete results of hypothesis tests

```
t1.1
```

```
##
##  Welch Two Sample t-test
##
## data:  toothDose0.5$len and toothDose1$len
```

```
## t = -6.4766, df = 37.986, p-value = 1.268e-07
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -11.983781  -6.276219
## sample estimates:
## mean of x mean of y
##    10.605    19.735
```

```
t1.2
```

```
##
##  Welch Two Sample t-test
##
## data:  toothDose0.5$len and toothDose2$len
## t = -11.799, df = 36.883, p-value = 4.398e-14
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -18.15617 -12.83383
## sample estimates:
## mean of x mean of y
##    10.605    26.100
```

```
t1.3
```

```
##
##  Welch Two Sample t-test
##
## data:  toothDose1$len and toothDose2$len
## t = -4.9005, df = 37.101, p-value = 1.906e-05
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -8.996481 -3.733519
## sample estimates:
## mean of x mean of y
##    19.735    26.100
```

```
t.test(len ~ supp, data = ToothGrowth)
```

```
##
##  Welch Two Sample t-test
##
## data:  len by supp
## t = 1.9153, df = 55.309, p-value = 0.06063
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.1710156  7.5710156
## sample estimates:
## mean in group OJ mean in group VC
##         20.66333         16.96333
```