course_project_part2.rmd

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Dataset ToothGrowth contains 60 observation of 3 variables: length of teeth, supplement method (factor with 2 levels "OJ" and "VC") and dose of vitamin C with 3 meanings.

```
library(ggplot2)
library(datasets)
str(ToothGrowth)
```

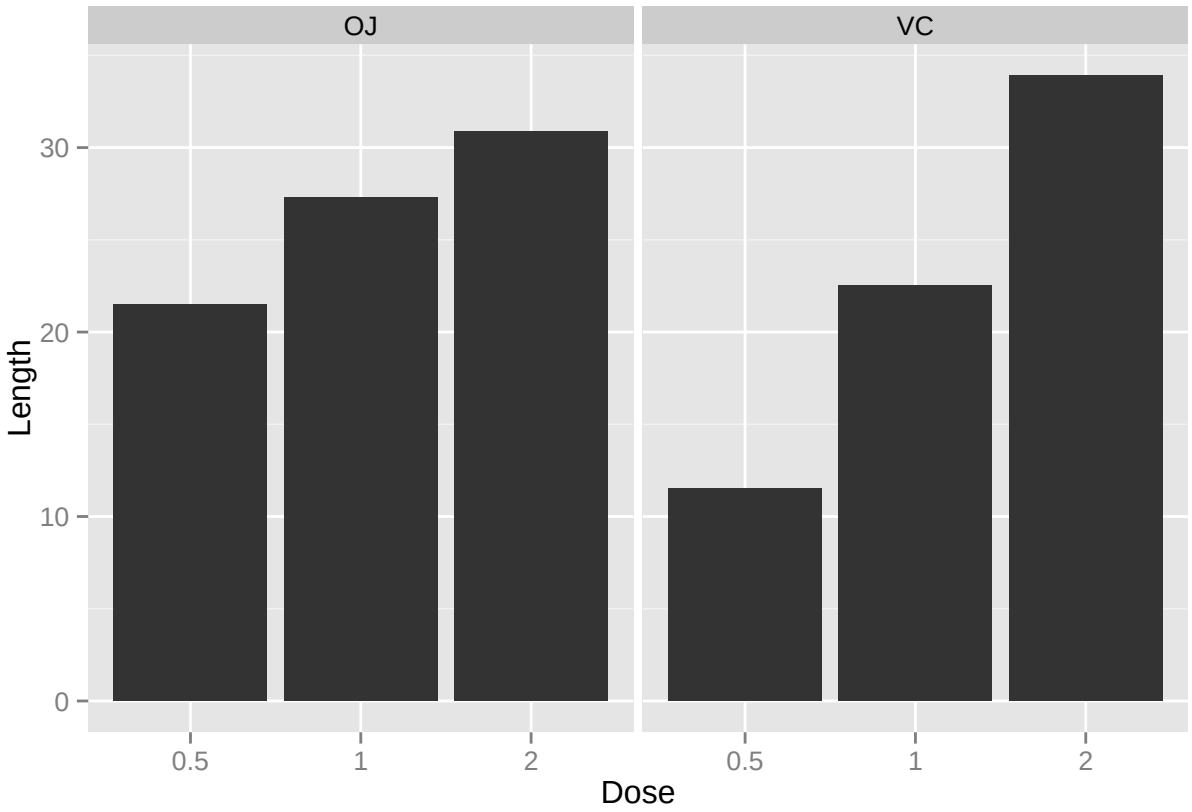
```
## 'data.frame':    60 obs. of  3 variables:
##  $ len : num  4.2 11.5 7.3 5.8 6.4 10 11.2 11.2 5.2 7 ...
##  $ supp: Factor w/ 2 levels "OJ","VC": 2 2 2 2 2 2 2 2 2 2 ...
##  $ dose: num  0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 ...
```

```
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
```

Lets plot our data for each of methods.

```
ggplot(data=ToothGrowth, aes(x=as.factor(dose), y=len)) +
  geom_bar(stat="identity",position=position_dodge()) +
    facet_grid(. ~ supp) +
    xlab("Dose") +
    ylab("Length")
```



Trying to investigate if supplement method affects on lenght of tooth. For this purpose we will use t-tests.

```
t.test(ToothGrowth$len[ToothGrowth$supp=="VC"], ToothGrowth$len[ToothGrowth$supp=="OJ"],
       paired = FALSE, var.equal = FALSE)
```

```
##
##  Welch Two Sample t-test
##
## data:  ToothGrowth$len[ToothGrowth$supp == "VC"] and ToothGrowth$len[ToothGrowth$supp == "OJ"]
## 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:
##  -7.5710156  0.1710156
## sample estimates:
## mean of x mean of y
##  16.96333  20.66333
```

As we can see we cant accept this hypothesis based on this test. So we should create 2-sample t-test.

```
t.test(ToothGrowth$len[ToothGrowth$dose==0.5], ToothGrowth$len[ToothGrowth$dose==1],
       paired = FALSE, var.equal = TRUE)
```

```
##
##  Two Sample t-test
##
## data:  ToothGrowth$len[ToothGrowth$dose == 0.5] and ToothGrowth$len[ToothGrowth$dose == 1]
## t = -6.4766, df = 38, p-value = 1.266e-07
```

```
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -11.983748  -6.276252
## sample estimates:
## mean of x mean of y
##    10.605    19.735
```

```
t.test(ToothGrowth$len[ToothGrowth$dose==0.5], ToothGrowth$len[ToothGrowth$dose==2],
       paired = FALSE, var.equal = TRUE)
```

```
##
##  Two Sample t-test
##
## data:  ToothGrowth$len[ToothGrowth$dose == 0.5] and ToothGrowth$len[ToothGrowth$dose == 2]
## t = -11.799, df = 38, p-value = 2.838e-14
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -18.15352 -12.83648
## sample estimates:
## mean of x mean of y
##    10.605    26.100
```

```
t.test(ToothGrowth$len[ToothGrowth$dose==2], ToothGrowth$len[ToothGrowth$dose==1],
       paired = FALSE, var.equal = TRUE)
```

```
##
##  Two Sample t-test
##
## data:  ToothGrowth$len[ToothGrowth$dose == 2] and ToothGrowth$len[ToothGrowth$dose == 1]
## t = 4.9005, df = 38, p-value = 1.811e-05
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  3.735613 8.994387
## sample estimates:
## mean of x mean of y
##    26.100    19.735
```

p in this tests less than 0.05 so we can say that dose of c-vitamin has affort to length of teeth.