

Statistical Inference Project - ToothGrowth analysis

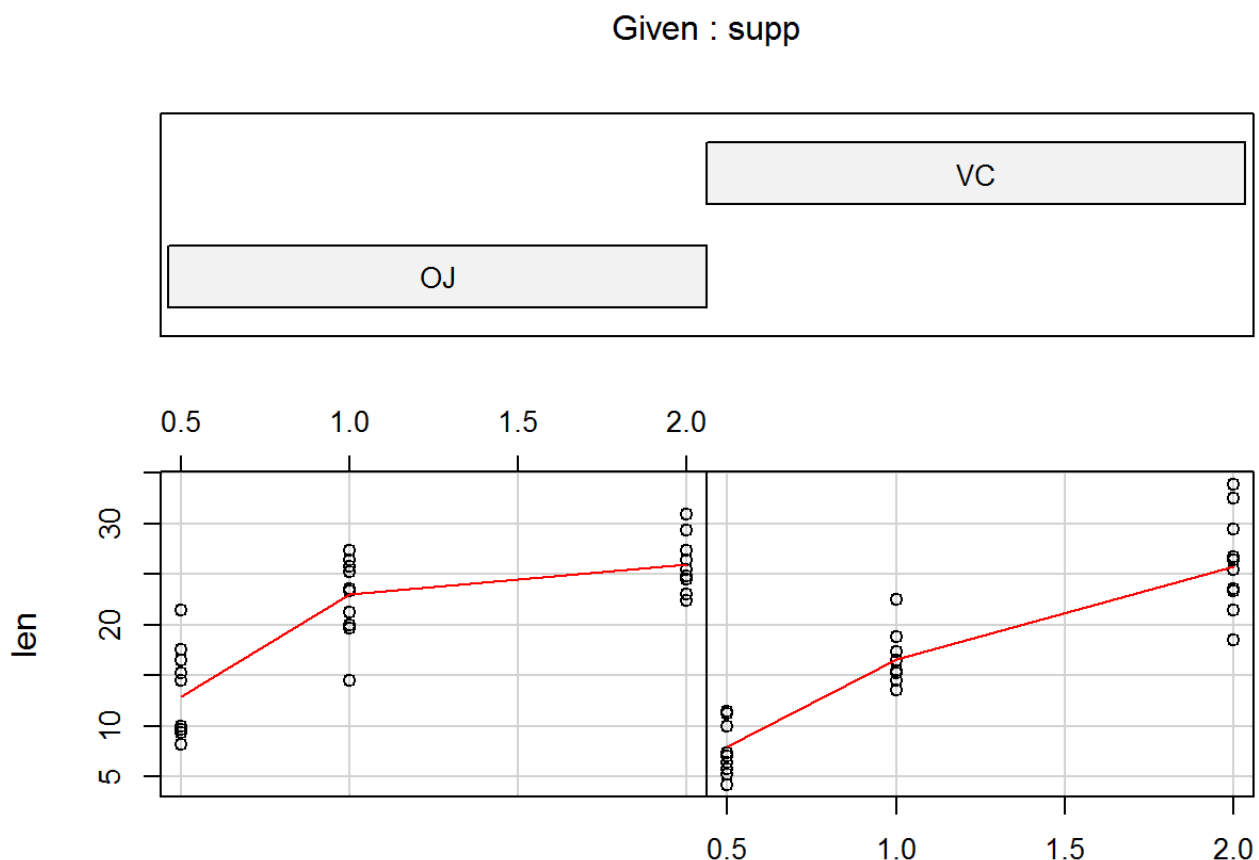
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Overview

In this report I will analyse the ToothGrowth dataset.

The ToothGrowth dataset is made of 60 observations. According to the description of the dataset, these observations map 6 groups of 10 guinea pigs, which for each group there were a dose level of Vitamin C administrated and a delivery method. From the dataset description, *“the response is 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) with each of two delivery methods (orange juice or ascorbic acid).”*

The following plot resumes the dataset:



ToothGrowth data: length vs dose, given type of supplement

Comparing tooth groth

I will compare the tooth growth by delivery method (variable *supp*) and dose level (variable *dose*). To do this I'll test if the means for OJ and for VC are equal and test for the lower and higher dose if the means are equal. I'll do this by making T tests, since the sample size is very small (10). Let's consider our alpha

as 0.5. Our null hypothesis is that there's no difference in tooth growth between delivery methods and between dose levels.

So for the first test (by delivery method):

```
t.test(ToothGrowth$len ~ ToothGrowth$supp, paired=FALSE, var.equal = FALSE)
```

```
##
## Welch Two Sample t-test
##
## data:  ToothGrowth$len by ToothGrowth$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
```

As the p value is greater than our alpha we fail to reject our null hypothesis, so we conclude there's no difference in tooth growth between delivery methods.

For the second test:

```
group <- subset(ToothGrowth, ToothGrowth$dose %in% c(0.5,2.0))
t.test(group$len ~ group$dose, paired=FALSE, var.equal = FALSE)
```

```
##
## Welch Two Sample t-test
##
## data:  group$len by group$dose
## 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 in group 0.5    mean in group 2
##           10.605           26.100
```

As the p value is very small we reject the null hypothesis and conclude that there is a difference in tooth growth between Vitamin C dose levels.