Hypothesis Testing

Etana Disasa

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EXERCISE

```
a_training = c(12.9, 13.5, 12.8, 15.6, 17.2, 19.2, 12.6, 15.3, 14.4, 11.3)
b_training = c(12.7, 13.6, 12.0, 15.2, 16.8, 20.0, 12.0, 15.9, 16.0, 11.1)
t.test(a_training, b_training, paired=TRUE)
```

```
##
##  Paired t-test
##
## data:  a_training and b_training
## t = -0.21331, df = 9, p-value = 0.8358
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.5802549  0.4802549
## sample estimates:
## mean of the differences
##                   -0.05
```

```
qt(0.95, 9)
```

```
## [1] 1.833113
```

In the above hypothesis testing, the p-value is 0.8358 which is greater than 0.05. Therefore, the new coach's training had not made any significant change to the team's performance.

The t-value generated by the test is less than t-tablulated therefore, we accept the null hypothesis.

```
a_training = c(12.9, 13.5, 12.8, 15.6, 17.2, 19.2, 12.6, 15.3, 14.4, 11.3)
b_training = c(12.0, 12.2, 11.2, 13.0, 15.0, 15.8, 12.2, 13.4, 12.9, 11.0)
t.test(a_training, b_training, paired=TRUE, alt="less")
```

```
##
##  Paired t-test
##
## data:  a_training and b_training
## t = 5.2671, df = 9, p-value = 0.9997
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##      -Inf 2.170325
## sample estimates:
## mean of the differences
##                    1.61
```

```r
pt(0.95, 9)
```

```
## [1] 0.816538
```

However, in this second coach's training, the p-value is larger than 0.05. Furthermore, given the alt="less" being the hypothesis, we reject the null hypothesis which means that the new coach's training has caused for a change.

DRUG TESTS XYX and ABC

Hypothesis is testing weather xyz or abc affect the BP of a patient using either.

```r
library(readxl)
library(data.table)
drug.trial <- read_excel("paired-t-test_3.xlsx")
before.trial <- melt(drug.trial[4,], value.name = "before.trial")$before.trial
after.trial.xyz <- melt(drug.trial[5,], value.name = "after.trial.xyz")$after.trial.xyz
after.trial.abc <- melt(drug.trial[11,], value.name = "after.trial.abc")$after.trial.abc

trial <-cbind(before.trial, after.trial.xyz, after.trial.abc)

t.test(trial[,1], trial[,2], paired=TRUE)
```

```
##
##  Paired t-test
##
## data:  trial[, 1] and trial[, 2]
## t = 1.1639, df = 11, p-value = 0.2691
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.3712632  1.2045965
## sample estimates:
## mean of the differences
##               0.4166667
```

Here, the p-value is greater than 0.05. Therefore, there is not a signficant difference in patient's BP after using XYZ.

```r
t.test(trial[,1], trial[,3], paired=TRUE)
```

```
##
##  Paired t-test
##
## data:  trial[, 1] and trial[, 3]
## t = 10.747, df = 11, p-value = 3.582e-07
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  5.566413 8.433587
## sample estimates:
## mean of the differences
##                       7
```

However, there, the p-value is significanly less than 0.05. Therefore, we reject the null hypothesis and take the hypothesis. Thus, there is a signficant difference and change in BP after patient's use medication abc.