# T-Test

## Lucky

**T-Test**

Automobile Insurance companies consider many factors including the miles driven by a driver and the gender. The data set consists of the reported miles (in thousands) driven by young drivers (25 years or less) in the previous year. One insurance company wants to know if there are any difference between the two genders.

    a. What are the Null and Alternate Hypothesis?

Null is H0: No difference between Male and Female

Alternative is Ha: Difference between Male and Female

    b. Do a variance test to see if the two variances are equal.

    c. Do the appropriate t-test at a $= 5\%$. What is your conclusion?

```r
# Clear the environment
rm(list = ls())
# Load readxl library
library(readxl)
# Read this excel file
prob3 <- read_excel("Example3.xlsx", sheet = "Prob3")
# Do a variance test to see if the two variances are equal
# Filter the data set
var1 <- which(prob3$Gender == "Male")
var2 <- which(prob3$Gender == "Female")
distance.male <- prob3$Distance[var1]
distance.female <- prob3$Distance[var2]
# Variance test
var.test <- var.test(distance.male, distance.female, alternative = "two.sided"); var.test
```

```
##
##  F test to compare two variances
##
## data:  distance.male and distance.female
## F = 0.9813, num df = 99, denom df = 99, p-value = 0.9254
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.6602573 1.4584363
## sample estimates:
## ratio of variances
##           0.9812967
```

```r
# Two variances are equal as the P-Value is larger than Alpha 0.05 and Fail the Reject Null
cat("Two variances are equal as the P-Value is larger than Alpha = 0.05 and Fail to Reject null hypothes
```

```
## Two variances are equal as the P-Value is larger than Alpha = 0.05 and Fail to Reject null hypothesi
```

```r
# Appropriate t-test at a = 5%.
t.test <- t.test(distance.male, distance.female, alternative = "two.sided"); t.test
```

```
##
##  Welch Two Sample t-test
##
## data:  distance.male and distance.female
## t = 1.4085, df = 197.98, p-value = 0.1606
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.2296479  1.3776479
## sample estimates:
## mean of x mean of y
##    10.233     9.659
```

```r
# What is your conclusion?
  # Fail to Reject null as the P-Value is larger than Alpha 0.05
  # No difference between Male and Female
cat("Fail to Reject null hypothesis as P-Value is larger than Alpha 0.05 and there're no difference betw
```

```
## Fail to Reject null hypothesis as P-Value is larger than Alpha 0.05 and there're no difference betwe
```