# R STUDIO – EXERCISE 8

## QUESTION 1

A machinist is expected to make engine parts with axle diameter of 1.75 cm. A random sample of 10 parts shows a mean diameter 1.85 cm with an SD of 0.1cm. On the basis of this sample, would you say that the work of the machinist is inferior?

```
> xbar = 1.75
> mu = 1.85
> n = 10
> s = 0.1
> H0: xbar = mu
> H1: xbar!= mu
> tcal = (xbar-mu)/(s/sqrt(n-1))
> tcal = abs(tcal)
> alpha = 0.05
> ttab = qt(1-(alpha/2),n-1)
> tcal
[1] 3
> ttab
[1] 2.262157
> if(tcal <= ttab){print("Accept H0")} else{print("Reject H0")}
[1] "Reject H0"
```

## QUESTION 2

The mean height and the SD height of 8 randomly chosen soldiers are 166.9 and 8.29 cm respy. The corresponding values of 6 randomly chosen silors are 170.3 and 8.5 cm respy. Based on this data, can we conclude that soldiers are, in general, shorter than sailors?

```
> n1 = 8
> x1bar = 166.9
> s1 = 8.29
> n2 = 6
```

```
> x2bar = 170.3
> s2 = 8.5
> sigma = sqrt(((n1*(s1^2))+(n2*(s2^2)))/(n1+n2-2))
> H0 : x1bar = x2bar
> H1 : x1bar < x2bar
> tcal = (x1bar - x2bar)/(sigma*(sqrt((1/n1)+(1/n2))))
> tcal = abs(tcal)
> ttab = qt(1-alpha,n1+n2-2)
> tcal
[1] 0.6954801
> ttab
[1] 1.782288
> if(tcal <= ttab){print("Accept H0")} else{print("Reject H0")}
[1] "Accept H0"
```

## QUESTION 3

Two samples of sizes 9 and 8 gave the sums of squares of deviations from their respective means equal to 160 and 91 respy. Can they be regarded as drawn from the same normal population?

```
> n1 = 9
> n1*(s1^2) = 160
> n2 = 8
> n2*(s2^2) = 91
> s1 = sqrt(160/n1)
> s2 = sqrt(91/n2)
> sigma1sq = (n1*(s1^2))/(n1-1)
> sigma2sq = (n2*(s2^2))/(n2-1)
> H0 : sigma1sq = sigma2sq
> H1 : sigma1sq != sigma2sq
> alpha = 0.05
> fcal = sigma1sq/sigma2sq
> fcal = abs(fcal)
> ftab = qf(1-(alpha/2),n1-1,n2-1)
```

```
> fcal
[1] 1.538462
> ftab
[1] 4.899341
> if(fcal <= ftab){print("Accept H0")} else{print("Reject H0")}
[1] "Accept H0"
```

## QUESTION 4

Two independent samples of 8 and 7 items respectively had the following values of the variable

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sample 1 | 9 | 11 | 13 | 11 | 15 | 9 | 12 | 14 |
| Sample 2 | 10 | 12 | 10 | 14 | 9 | 8 | 10 | |

Do the sample variances differ significantly?

```
> n1 = 8
> n2 = 7
> sample1 <- c(9,11,13,11,15,9,12,14)
> sample2 <- c(10,12,10,14,9,8,10)
> s1 = sd(sample1)
> s2 = sd(sample2)
> sigma1sq = (n1*(s1^2))/(n1-1)
> sigma2sq = (n2*(s2^2))/(n2-1)
> H0 : sigma1sq = sigma2sq
> H1 : sigma1sq != sigma2sq
> fcal = sigma1sq/sigma2sq
> fcal = abs(fcal)
> alpha = 0.05
> ftab = qf(1-(alpha/2),n1-1,n2-1)
> fcal
[1] 1.186132
> ftab
[1] 5.69547
> if(fcal <= ftab){print("Accept H0")} else{print("Reject H0")}
[1] "Accept H0"
```