LAB ASSIGNMENT – 5

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SLOT	L7+L8
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Q.1(a)

A random sample of 10 boys with the following IQs: 70, 120, 110, 101, 88, 83, 95, 98, 107, and 100. Write down the *R* programming code to test whether the data support the assumption of a population mean IQ of 100 at 5 % level of significance.

Null Hypothesis(H_0): Sample Mean = Population Mean

Alternative Hypothesis(H_1): Sample Mean ≠ Population Mean

R CODE & OUTPUT:

```
> x=c(70,120,110,101,88,83,95,98,107,100)
> t.test(x,mu=100)

        One Sample t-test

data:  x
t = -0.62034, df = 9, p-value = 0.5504
alternative hypothesis: true mean is not equal to 100
95 percent confidence interval:
  86.98934 107.41066
sample estimates:
mean of x
     97.2
```

ANS:

Since p value = 0.5504 is much greater than significance level i.e. 0.05, we accept the null hypothesis. Hence, Sample Mean = Population Mean at 5% LOS.

The t-computed value (-0.62034) is smaller than t-tabulated (2.262), we accept the null hypothesis of equality of the means.

Q.1(b)

The mean height and the standard deviation height of 8 randomly chosen soldiers are 166.9 cm and 8.29 cm respectively. The corresponding values of 6 randomly chosen sailors are 170.3 cm and 8.50 cm respectively. Write down the *R* programming code to test whether the soldiers are shorter than the sailors on the basis of average height.

Null Hypothesis(H_0): Height of Soldiers = Height of Sailors

Alternative Hypothesis(H_1): Height of Soldiers < Height of Sailors

R CODE & OUTPUT:

```
> x=rnorm(n=8,mean=166.9,sd=8.29)
> y=rnorm(n=6,mean=170.3,sd=8.50)
> t.test(x,y,alt="less",var.equal=TRUE)

        Two Sample t-test

data:  x and y
t = -1.7763, df = 12, p-value = 0.05051
alternative hypothesis: true difference in means is less than 0
95 percent confidence interval:
       -Inf 0.02861134
sample estimates:
mean of x mean of y
 166.7140  175.1583
```

ANS:

Since p value = 0.05051 is greater than significance level i.e. 0.05 and the t-computed value (-1.7763) is smaller than t-tabulated (1.782), we accept the null hypothesis. Hence, soldiers are not shorter than sailors at 5% LOS.

Q.2

Two random samples drawn from two normal populations with the following observations.

Sample I :	21	24	25	26	27	
Sample II :	22	27	28	30	31	36

Write down the *R* programming code to test whether the two populations have the same variance at 5 % level of significance.

Null Hypothesis(H_0):

Variance of Sample I = Variance of Sample II

Alternative Hypothesis(H_1):

Variance of Sample I ≠ Variance of Sample II

R CODE & OUTPUT:

```
> x=c(21,24,25,26,27)
> y=c(22,27,28,30,31,36)
> var.test(x,y,alt="two.sided")

        F test to compare two variances

data:  x and y
F = 0.24537, num df = 4, denom df = 5, p-value = 0.1981
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval:
 0.03321253 2.29776367
sample estimates:
ratio of variances
         0.2453704
```

ANS:

Since p value = 0.1981 is greater than significance level i.e. 0.05 and the F-computed value (0.24537) is smaller than F-tabulated (4.95), we accept the null hypothesis. Hence, Variance of Sample I = Variance of Sample II at 5% LOS.