

# **MAT5007 – Applied Statistical Methods**

## **Embedded Lab – R Statistical Software**

FALL SEMESTER – 2022~2023 L25+L26 SLOT

### **E-RECORD**

Assignment No.: 6

Submitted By  
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**Date: 25/12/2022**

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## Experiment 1:

Before an increase in excise duty on tea, 800 people out of a sample of 1000 were consumers of tea. After the increase in duty, 800 people were consumers of tea in a sample of 1200 persons. Write down the R programming code to test whether the significant decrease in the consumption of tea after the increase in duty at 1 % level of significance.

```
> n1 = 1000
> p1 = 800 / 1000
> q1 = 1 - p1
> n2 = 1200
> p2 = 800 / 1200
> q2 = 1 - p2
> z = (p1 - p2) / sqrt(((p1 * q1) / n1) + ((p2 * q2) / n2))
> z
> zalpha = qnorm(p=.01, lower.tail=FALSE)
> zalpha
> abs(z) < abs(zalpha)
```

```
> n1 = 1000
>
> p1 = 800 / 1000
>
> q1 = 1 - p1
>
> n2 = 1200
>
> p2 = 800 / 1200
>
> q2 = 1 - p2
>
> z = (p1 - p2) / sqrt(((p1 * q1) / n1) + ((p2 * q2) / n2))
>
> z
[1] 7.1765
>
> zalpha = qnorm(p=.01, lower.tail=FALSE)
>
> zalpha
[1] 2.326348
>
> abs(z) < abs(zalpha)
[1] FALSE
```

**Interpretation:** Here since the  $|z| > |z_{\alpha}|$  we reject the null hypothesis (consumption of tea after the increase in duty is same as before) and accept the alternative hypothesis i.e. there is a significant decrease in the consumption of tea after the increase in duty at 1% level of significance.

## Experiment 2:

The average mark scored by 32 boys is 72 with a standard deviation of 8, while that for 36 girls is 70 with a standard deviation of 6. Write down the R programming code to test whether the boys are performing better than girls on the basis of average mark at 5 % level of significance.

```
> n1 = 32
> x1 = 72
> sd1 = 8
> n2 = 36
> x2 = 70
> sd2 = 6
> z = (x1 - x2) / sqrt((sd1 ^ 2 / n1) + (sd2 ^ 2 / n2))
> z
> zalpha = qnorm(p=.05, lower.tail=FALSE)
> zalpha
> abs(z) < abs(zalpha)
```

```
> n1 = 32
>
> x1 = 72
>
> sd1 = 8
>
> n2 = 36
>
> x2 = 70
>
> sd2 = 6
>
> z = (x1 - x2) / sqrt((sd1 ^ 2 / n1) + (sd2 ^ 2 / n2))
>
> z
[1] 1.154701
>
> zalpha = qnorm(p=.05, lower.tail=FALSE)
>
> zalpha
[1] 1.644854
>
> abs(z) < abs(zalpha)
[1] TRUE
```

**Interpretation:** Here since the  $|z| < |z_{\alpha}|$  we accept the null hypothesis i.e. the boys are not performing better than girls on the basis of average mark at 5% level of significance.