



भारतीय सूचना प्रौद्योगिकी संस्थान गुवाहाटी

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY GUWAHATI

Data Analytics Lab, M.Tech 3rd Semester

## **Assignment-6**

Name - Mushtaq K islam

Roll no. - 2102025

Mode of instruction - Oncampus

Write R programs for the following experiments:

1. A coffee vendor nearby Guwahati railway station has been having average sales of  $x$  cups per day. Because of the development of a bus stand nearby, it expects to increase its sales.

During the first  $n$  days, after the inauguration of the bus stand, the daily sales were

$a_1, a_2, \dots, a_n$ . On the basis of this sample information, can we conclude that the sales of coffee have increased? WAP to perform t-test to test the hypothesis considering  $\alpha$  as the level of confidence.

User Inputs:  $x$ ,  $n$ ,  $(a_1, a_2, \dots, a_n)$ ,  $\alpha$  and anything that you feel necessary.

34:2 (top level) ▾

Console Terminal Background Jobs

R 4.1.2 · ~/

[Workspace loaded from ~/.RData]

```
> {t.test1 = function(x,n,arr,alpha){
+
+   #calculate S
+   a = array()
+   for (i in arr){
+     a = append(a,(i-mean(arr))^2 )
+   }
+   a = a[2:length(arr)]
+   #print(a)
+   S = sqrt(sum(a) / (n-1))
+   print(S)
+   t = (mean(arr) - x) / (S/sqrt(n))
+   #print(t)
+   return (t)
+ }
+
+ x = 500
+ n = 12
+ arr = c(550,570,490,615,505,580,570,460,600,580,530,526)
+ alpha = 5 # we can choose alpha = 0.01, 0.05, 0.1
+
+ t = t.test1(x,n,arr,alpha)
+
+ h0 = 500 #Null Hypothesis
+ df = n-1
+ critical_hypothesis = qt((alpha/100),df)
+ critical_hypothesis
+ if(t > critical_hypothesis){
+   paste("we will reject the Null hypothesis,alternative hypothesis is correct hence, Our sales is increased")
+ }
+ else{
+   paste("Our Null hypothesis is correct hence our mean is 500")
+ }
+ }
[1] 46.21491
[1] "we will reject the Null hypothesis,alternative hypothesis is correct hence, Our sales is increased"
> |
```

2. A medicine production company packages medicine in a tube of 8 ml. In maintaining the control of the amount of medicine in tubes, they use a machine. To monitor this control a sample of  $n$  tubes is taken from the production line at random time interval and their contents are measured precisely. The mean amount of medicine in these  $n$  tubes will be used to test the hypothesis that the machine is indeed working properly. WAP to perform the following tasks:

- i) create a population of 500 counts in normal distribution with  $\mu = 8$  and  $\sigma = 0.7$ .
- ii) pick a random sample of size  $n(< 500)$ .
- iii) perform Z-test to test the hypothesis considering  $\alpha$  as the level of confidence.

User Inputs:  $n$ ,  $\alpha$  and anything that you feel necessary.

```
07:42 | Top Level |
Console Terminal x Background Jobs x
R 4.1.2 · ~/
> {
+ #Q2.i> i) create a population of 500 counts in normal distribution with  $\mu = 8$  and  $\sigma = 0.7$ .
+ set.seed(123)
+ x = c(rnorm(500,8,0.7))
+ arr = x[1:500]
+ meu = 8
+ alpha = 5
+ df = length(arr) - 1
+ S = 0.7
+
+ z.test = function(arr,m,S){
+
+   #print(a)
+   n = length(arr)
+
+   z = (mean(arr) - m) / (S/sqrt(n))
+   #print(t)
+   return (z)
+ }
+ z = z.test(arr,meu,S)
+ print(z)
+ critical_hypothesis = qt((alpha/200),df,lower.tail = FALSE)
+ print(critical_hypothesis)
+ {
+ if(z > critical_hypothesis){
+   paste("we will reject the Null hypothesis,alternative hypothesis is correct hence, Our sales is increased")
+ }
+ else{
+   paste("Our Null hypothesis is correct hence our mean is = ",meu)
+ }
+ }
+
+ }
[1] 0.7734659
[1] 1.964729
[1] "Our Null hypothesis is correct hence our mean is = 8"
> |
```