20MIA1150
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Assignment-8&9

Testing of Hypothesis-II:

1.Suppose that 10 volunteers have taken an intelligence test; here are the results obtained. The average score of the entire population is 75 in the same test. Is there any significant difference (with a significance level of 95%) between the sample and population means, assuming that the variance of the population is not known.Scores: 65, 78, 88, 55, 48, 95, 66, 57, 79, 81

```
> score = c(65, 78, 88, 55, 48, 95, 66, 57, 79, 81)

> t.test (score, mu=75)


        One Sample t-test


data:  score

t = -0.78303, df = 9, p-value = 0.4537

alternative hypothesis: true mean is not equal to 75

95 percent confidence interval:

 60.22187 82.17813

sample estimates:

mean of x

    71.2


> qt(0.975, 9)

[1] 2.262157
```

>

> #p-value is greater than 0.05 then we accept the null hypothesis H0; if p-value is less
#than 0.05 then we reject the null hypothesis H0

```
Console   Terminal ×   Jobs ×
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>  t.test (score, mu=75)

        One Sample t-test

data:  score
t = -0.78303, df = 9, p-value = 0.4537
alternative hypothesis: true mean is not equal to 75
95 percent confidence interval:
 60.22187 82.17813
sample estimates:
mean of x
     71.2

>
>  qt(0.975, 9)
[1] 2.262157
> #p-value is greater than 0.05 then we accept the null hypothesis H0; if p-value is less
 #than 0.05 then we reject the null hypothesis H0
>
> |
```

2.In one sample of 8 observations, the sum of the squares of deviations of the sample values from the sample mean was 84.4 and in the other sample of 10 observations it was 102.6. Test whether this difference is significant at 5% level, given that the 5% point of F for n_1=7 and n_2=9 degrees of freedom is 3.29.

> #level of significance=5% with (n1-1.n2-1)degree of freedom

> #Tabulated F(0.05) for 7,9 defrees of freedom 3.29

> n1= 8

> n2=10

> S1square=(1/(n1-1))*(84.4)

> S1square

[1] 12.05714

> S2square=(1/(n2-1))*(102.6)

> S2square

[1] 11.4

> F=S1square/S2square

> F

[1] 1.057644

> #Calculated Value of F : 1.057644

> #degree of freedom 3.29

> #Since, calculated value is less than table value at 5% level of significance

> #we Accept the hypothesis

>

```
Console   Terminal ×   Jobs ×
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> #level of significance=5% with (n1-1.n2-1)degree of freedom
>  #Tabulated F(0.05) for 7,9 defrees of freedom 3.29
>     n1= 8
>      n2=10
>      S1square=(1/(n1-1))*(84.4)
>     S1square
[1] 12.05714
>     S2square=(1/(n2-1))*(102.6)
>  S2square
[1] 11.4
>
>      F=S1square/S2square
>
>
>     #Calculated Value of F : 1.057644
>          #degree of freedom 3.29
>          #Since, calculated value is less than table value at 5% level of significance
>          #we Accept the hypothesis
>
> |
```

3. A survey of 320 families with 5 children each revealed the following distribution:

No. of Boys	5	4	3	2	1	0
No. of Girls	0	1	2	3	4	5
No. of Families	14	56	110	88	40	12

Is this result consistent with the hypothesis that boy and girl births are equally possible?

```
> #Number of families selected for the survey, N = 320

> #The probability of female and male birth is equal, p = 0.5

> #Number of children in the selected families, k = 6

>

> #H0: The probability of female and male birth is equal.

>

> #Ha: The probability of female and male birth is not equal.

> N=320

> p=.5

> k=6

> E0=N*((comb(5,0)*(p^0)*(1-p)^(5-0)))

> E0

[1] 10

> E1=N*((comb(5,1)*(p^1)*(1-p)^(5-1)))

> E1

[1] 50

> E2=N*((comb(5,2)*(p^2)*(1-p)^(5-2)))

> E2
```

```
[1] 100

> E3=N*((comb(5,3)*(p^3)*(1-p)^(5-3)))

> E3

[1] 100

> E4=N*((comb(5,4)*(p^4)*(1-p)^(5-4)))

> E4

[1] 50

> E5=N*((comb(5,5)*(p^5)*(1-p)^(5-5)))

> E5

[1] 10

> #calculating the chi-square test statistic

> n=5

> alpha=0.05

> N=320 # Total number of families

> P<-0.5 # probability of male birth

> x=c(0:n)

> obf<-c(14,56,110,88,40,12) # observed frequencies

> exf<-(dbinom(x,n,P)*320) # expected frequencies

> # check the condition if the observed and expected frequencies sum are equal
sum(obf)

> sum(exf)

[1] 320

> chisq<-sum((obf-exf)^2/exf)
```

```
> cv=chisq
> tv=qchisq(1-alpha,n-1)
> if(cv <= tv){print("Accept Ho")} else{print("Reject Ho")}
[1] "Accept Ho"
> tv
[1] 9.487729
> cv
[1] 7.16
```

>

Console Terminal × Jobs ×

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```
>  #Number of families selected for the survey, N = 320
>      #The probability of female and male birth is equal, p = 0.5
>     #Number of children in the selected families, k = 6
>     #H0: The probability of female and male birth is equal.
>  #Ha: The probability of female and male birth is not equal.
> N=320
> p=.5
> k=6
> E0=N*((comb(5,0)*(p^0)*(1-p)^(5-0)))
> E0
[1] 10
> E1=N*((comb(5,1)*(p^1)*(1-p)^(5-1)))
> E1
[1] 50
> E2=N*((comb(5,2)*(p^2)*(1-p)^(5-2)))
> E2
[1] 100
> E3=N*((comb(5,3)*(p^3)*(1-p)^(5-3)))
> E3
[1] 100
> E4=N*((comb(5,4)*(p^4)*(1-p)^(5-4)))
> E4
[1] 50
> E5=N*((comb(5,5)*(p^5)*(1-p)^(5-5)))
> E5
[1] 10
>
>
> alpha=0.05
> N=320 # Total number of families
> P<-0.5 # probability of male birth
> x=c(0:n)
> obf<-c(14,56,110,88,40,12) # observed frequencies
> exf<-(dbinom(x,n,P)*320) # expected frequencies
> # check the condition if the observed and expected frequencies sum are equal sum(obf)
> sum(exf)
[1] 320
> chisq<-sum((obf-exf)^2/exf)
> cv=chisq
> tv=qchisq(1-alpha,n-1)
> if(cv <= tv){print("Accept H0")} else{print("Reject H0 accept Ha")}
[1] "Accept H0"
```

```
> cv
[1] 7.16
> tv
[1] 9.487729
>
```