VIT®

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

School of Advanced Sciences

Department of Mathematics

Fall Semester – 2020~21

MAT 2001 – Statistics for Engineers – R LAB

Lab Assessment - V

L7+L8 / L35+L36 Faculty: Dr.S.Nandhini

Instruction for Students

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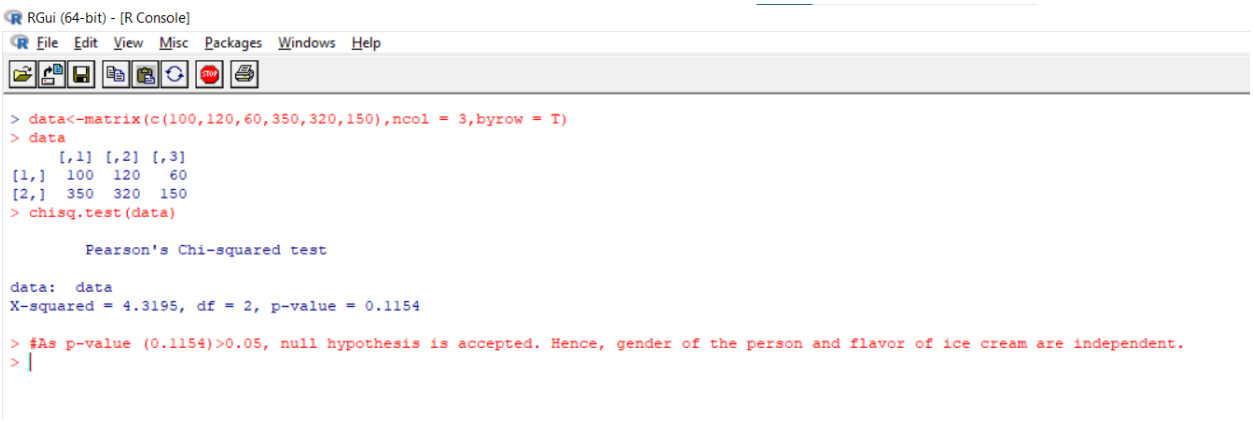
1. The following data come from a hypothetical survey of 920 people (Men, Women) that ask for their preference of one of the three ice cream flavors (Chocolate, Vanilla, Strawberry). Is there any association between gender and preference for ice cream flavor?

Gender\flavor	Chocolate	Vanilla	Strawberry
Men	100	120	60
Women	350	320	150

R CODE:

```
> data<-matrix(c(100,120,60,350,320,150),ncol = 3,byrow = T)
> data
> chisq.test(data)
```

OUTPUT:



INFERENCE:

As p-value (0.1154)>0.05, null hypothesis is accepted. Hence, gender of the person and flavor of ice cream are independent.

2. As a part of quality improvement project focused on a delivery of mail at a department office within a large company, data were gathered on the number of different addresses that had to be changed so that the mail could be redirected to thee correct mail stop. Table shows the frequency distribution. Fit binomial distribution and test goodness of fit

x	0	1	2	3	4
fx	5	20	45	20	10

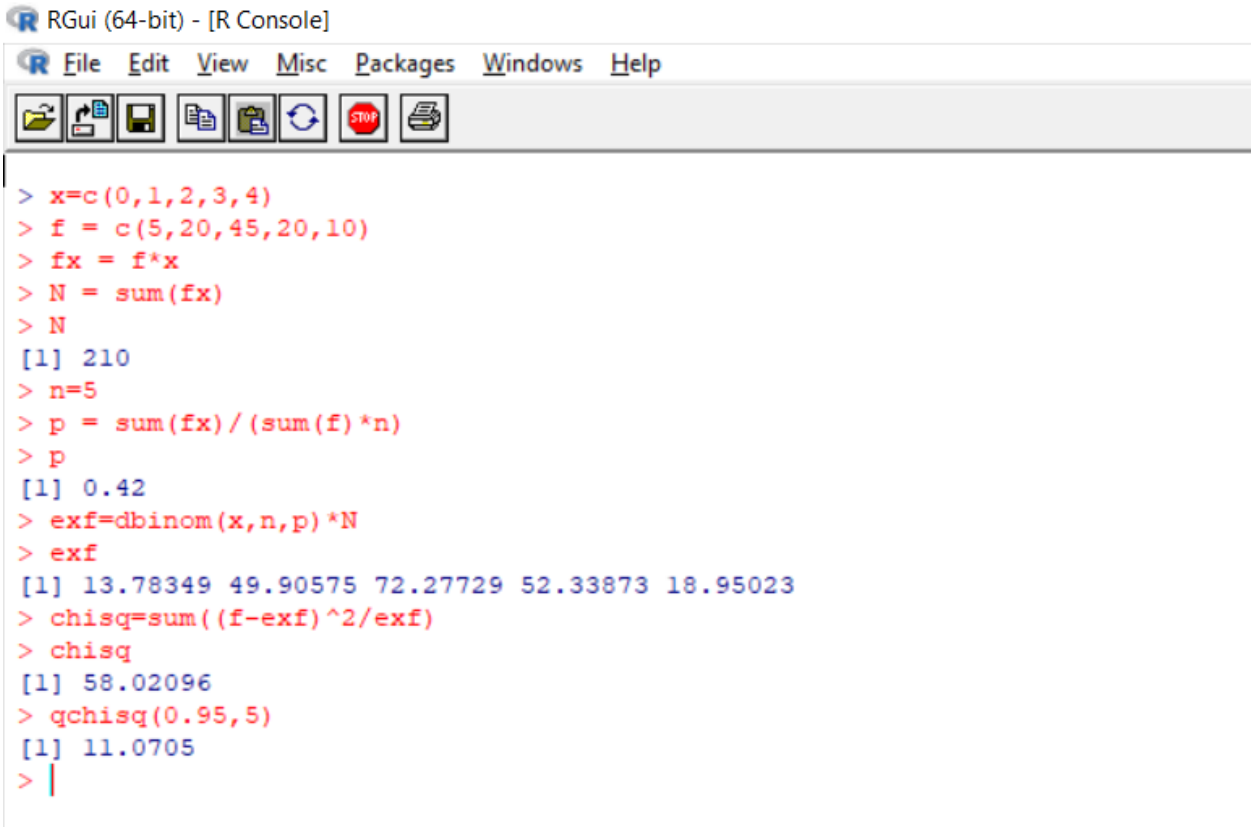
The number of Addresses Needing Change

R CODE:

```
>x=c(0,1,2,3,4)
>f = c(5,20,45,20,10)
>fx = f*x
>N = sum(fx)
>N
>n=5
>p = sum(fx)/(sum(f)*n)
>p
```

```
>exf=dbinom(x,n,p)*N
>exf
>chisq=sum((f-exf)^2/exf)
>chisq
>qchisq(0.95,5)
```

OUTPUT:



3. A series of traps were set in line across sand dunes and the numbers of different types of insects caught in a fixed time interval are recorded to study their movement across the dune. Following table shows the data on the movement of leafhopper (Hemiptera) across a sand dune.

Leafhopper(Hemiptera) Per trap X_i	Frequency f_i
0	6
1	8
2	12
3	4
4 or more	3

Movement of Leafhopper Across a Sand Dune

Fit Poisson distribution to the above data and test goodness of fit.

R CODE:

```
>x=0:4
>f=c(6,8,12,4,3)
>lambda = sum(f*x)/sum(f)
>lambda
>expf=dpois(x,lambda)*sum(f)
>f1=round(expf)
>f1
>sum(f)
>sum(f1)
>obf=c(6,8,19)
>exf=c(6,10,4)
>chisq=sum((obf-exf)^2/exf)
>chisq
>qchisq(0.95,2)
```

RGui (64-bit) - [R Console]

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```
> x=0:4
> f=c(6,8,12,4,3)
> lambda = sum(f*x)/sum(f)
> lambda
[1] 1.69697
> expf=dpois(x,lambda)*sum(f)
> fl=round(expf)
> fl
[1]  6 10  9  5  2
> sum(f)
[1] 33
> sum(fl)
[1] 32
> obf=c(6,8,19)
> exf=c(6,10,4)
> chisq=sum((obf-exf)^2/exf)
> chisq
[1] 56.65
> qchisq(0.95,2)
[1] 5.991465
>
```