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EXPERIMENT: -3

SLOT: -L15 +L16

COURSE: - MAT2001

EXPERIMENT-3

BINOMIAL, POISSON AND NORMAL DISTRIBUTION

1. It is known that probability of an item produced by a certain machine will be defective is 0.05. If the produced items are sent to the market in packets of 20, then write down the R code to find the number of packets containing at least, exactly and at most 2 defective items in a consignment of 1000 packets.

CODE: -

```
> #Binomial Distribution

> n=20

> p=0.05

> q=1-p
```

```
> N=1000
> k=2
> N1=round(N*(1-pbinom(k-1,n,p)))
> N1
[1] 264
> N2=round(N*dbinom(k,n,p))
> N2
[1] 189
> N3=round(N*(pbinom(k,n,p)))
> N3
[1] 925
```

RESULT

Number of packets containing

- At least = N1= 264
- Exactly = N2= 189
- At most = N3= 925

2. A car hire firm has 2 cars which it hires out day by day. The number of demands for a car on each day follows a Poisson distribution with mean 1.5. Write down the R code to compute the proportion of days on which
(i) Neither car is used,
(ii)At most one car is used and
(iii)Some demand of car is not fulfilled.

CODE: -

```
> lam=1.5

> x=0

> P1=dpois(x,lam)

> P1

[1] 0.2231302

> x=1

> P2=ppois(x,lam)

> P2

[1] 0.5578254

> x=2

> P3=1-ppois(x,lam)

> P3

[1] 0.1911532
```

RESULT

Proportion of

- Neither car used= P1= 0.2231302
- At most one car used= P2=0.5578254
- Some demand of car not fulfilled=P3= 0.1911532

3. The local corporation authorities in a certain city install 10,000 electric lamps in the streets of the city with the assumption that the life of lamps is normally distributed. If these lamps have an average life of 1,000 burning hours with a standard deviation of 200 hours, then write down the R code to calculate the number of lamps might be expected to fail in the first 800 burning hours and also the number of lamps might be expected to fail between 800 and 1,200 burning hours.

CODE: -

```
> Mu=1000

> SD=200

> N=10000

> x1=800

> N1=round(N*pnorm(x1,Mu,SD))

> N1

[1] 1587

> x2=1200

> N2=round(N*(pnorm(x2,Mu,SD)-pnorm(x1,Mu,SD)))

> N2

[1] 6827
```

RESULT

Number of lamps expected to be failed in:

- First 800 hours= N1= 1587
- Between 800 and 1200 hours= N2= 6827

4. Find the following and plot the graph (Assume it's a standard normal distribution).

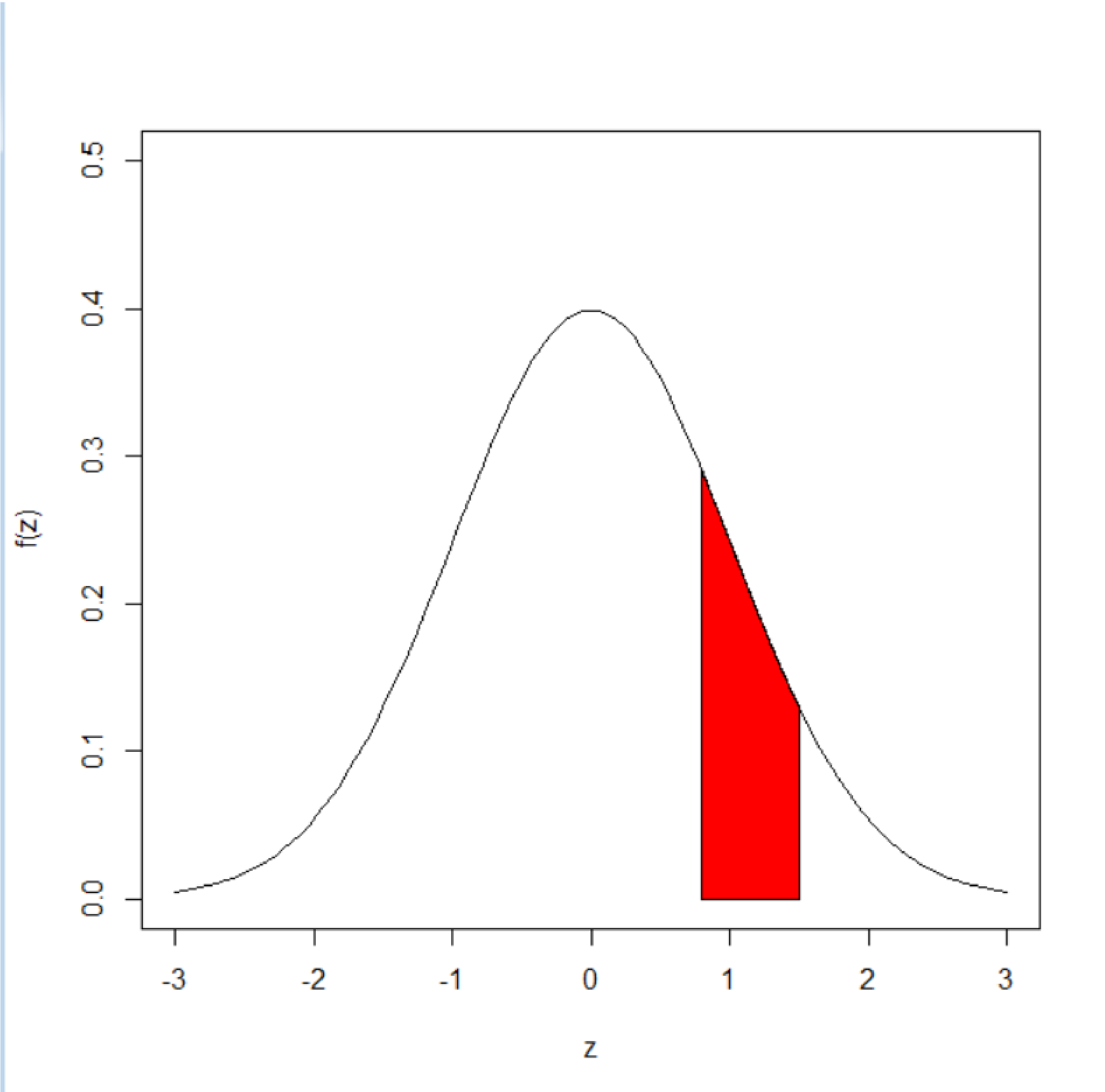
(i) $P(0.8 \leq Z \leq 1.5)$

(ii) $P(Z \leq 2)$

(iii) $P(Z \geq 1)$.

CODE: -
i)

```
> pnorm (1.5) - pnorm (0.8)

[1] 0.1450482

> plot.new()

> curve(dnorm,xlim=c(-3,3),ylim=c(0,0.5),xlab="z",ylab="f(z)")

> zleft=0.8

> zright = 1.5

> x=c(zleft,seq(zleft,zright,by=.001),zright)

> y=c(0, dnorm(seq(zleft,zright,by=.001)),0)

> polygon (x, y,col="red")
```



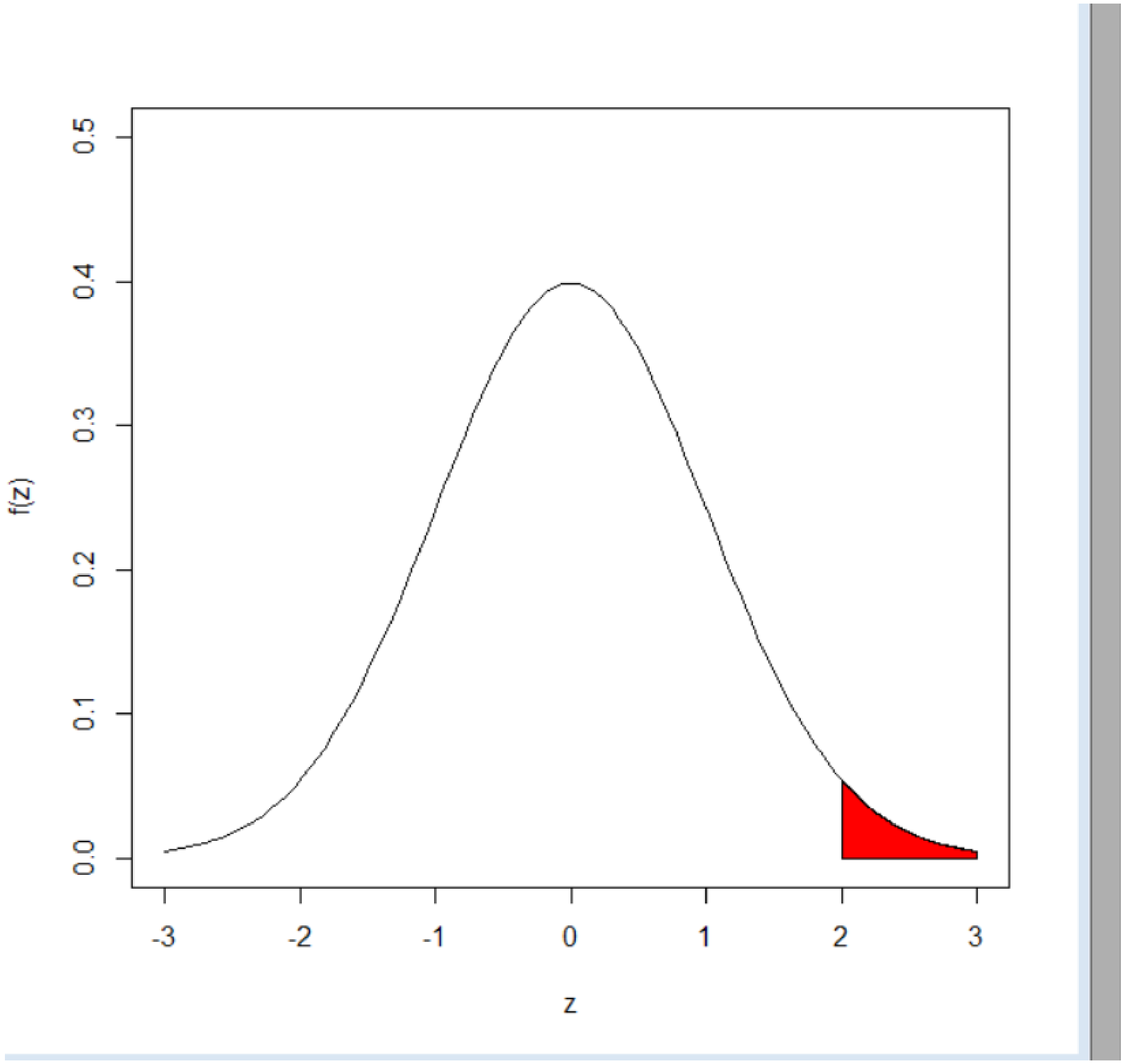
ii)

pnorm(2)

[1] 0.9772499

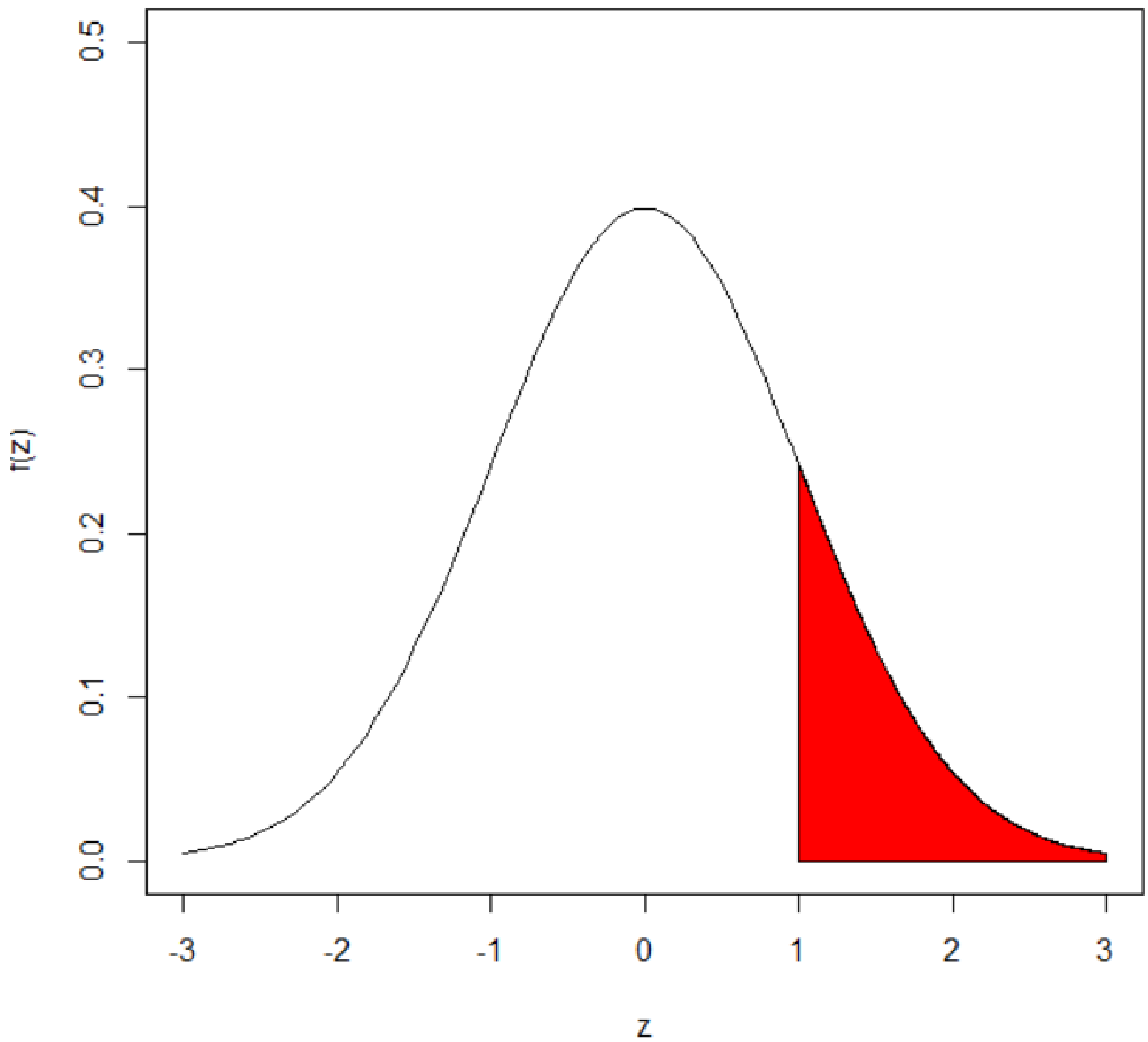
> plot.new()

```
> curve(dnorm,xlim=c(-3,3),ylim=c(0,0.5),xlab="z",ylab="f(z)")

> z=2

> x=c(z,seq(z,3,by=0.001),3)

> y=c(0,dnorm(seq(z,3,by=.001)),0)

> polygon(x,y,col="red")
```



iii)

```
(1-pnorm(1))

[1] 0.1586553

> plot.new()

> curve(dnorm,xlim=c(-3,3),ylim=c(0,0.5),xlab="z",ylab="f(z)")

> z=1

> x=c(z,seq(z,3,by=.001),3)

> y=c(0,dnorm(seq(z,3,by=.001)),0)

> polygon(x,y,col="red")
```


0.5
0.4
0.3
0.2
0.1
0.0
f(z)
-3
-2
-1
0
1
2
3
z

5. If mean=70 and Standard deviation is 16, then find the following and plot the graph with text (Assume it's a normal distribution).

(i) $P(38 \leq X \leq 46)$

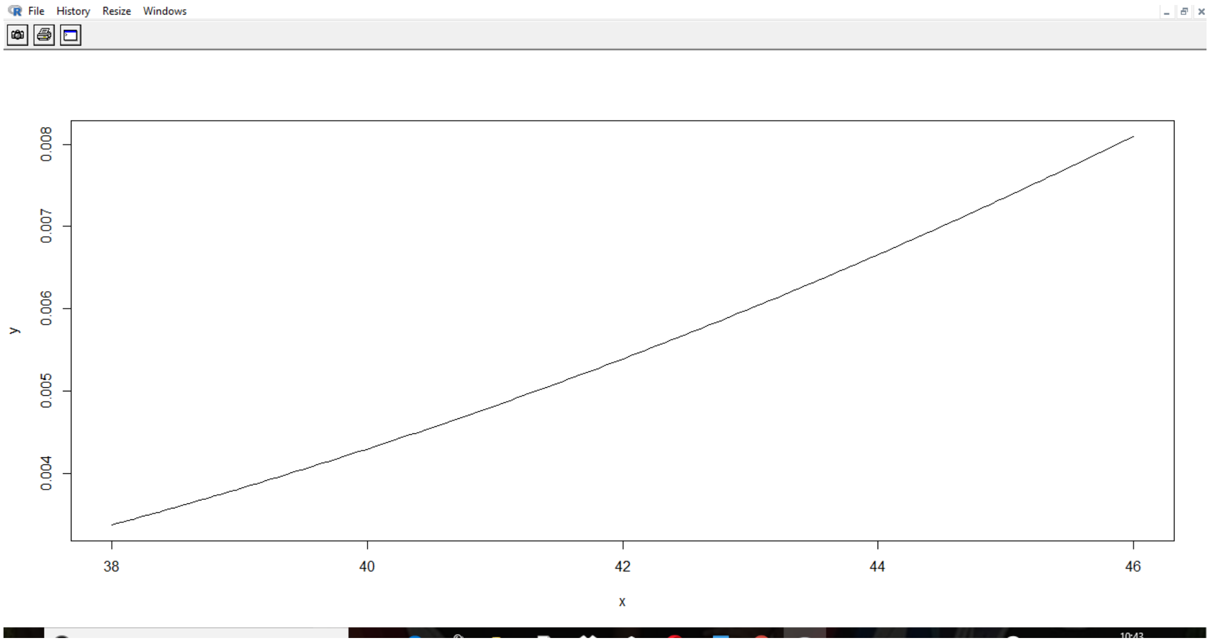
(ii) $P(82 \leq X \leq 94)$

(iii) $P(62 \leq X \leq 86)$.

CODE: -

i)

```
> x=seq(38,46,length=200)

> y=dnorm(x,mean=70,sd=16)

> plot(x,y,type="l")
```

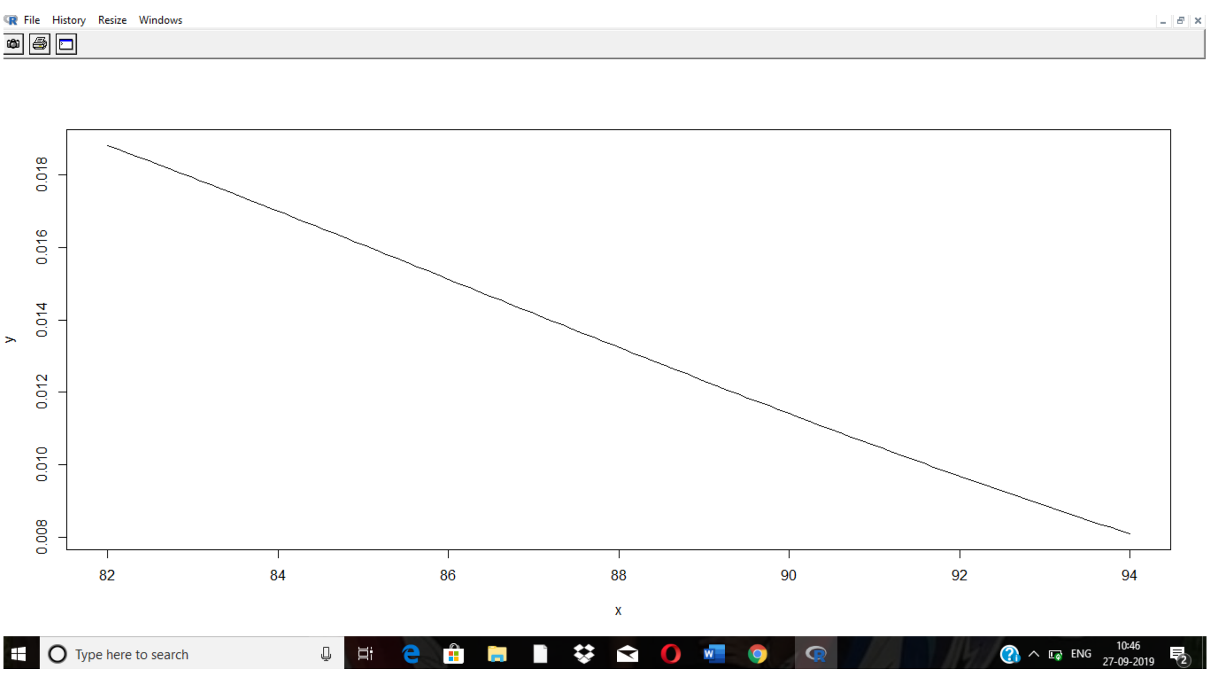


ii)

x=seq(82,94,length=100)

> y=dnorm(x,mean=70,sd=16)

> plot(x,y,type="l")



iii)

```
> x=seq(62,86,length=50)

> y=dnorm(x,mean=70,sd=16)

> plot(x,y,type="l")
```