Experiment – 5

22BMH1131

ANOVA and Probability testing

ANOVA

1.

Aim:

To perform Analysis of variance (ANOVA) test and find the table values.

Data:

```
> x=c(8,10,12,8,7,12,11,9,14,4,18,12,16,6,8,13,9,12,16,15)
> schools=c(rep("a", 5), rep("b",5), rep("c",5), rep("d", 5))
```

Syntax:

```
> f=aov(x~schools)
> summary (f)
> anova (f)
```

Output:

```
            Df Sum Sq Mean Sq F value Pr(>F)
schools      3     50   16.67   1.282  0.314
Residuals   16    208   13.00
Analysis of Variance Table

Response: x
          Df Sum Sq Mean Sq F value Pr(>F)
schools    3     50  16.667  1.2821 0.3144
Residuals 16    208  13.000
```

Conclusion:

Analysis of variance (ANOVA) test is performed and the table values for the given input data is found.

Probability-Test

2.

Binomial Distribution

Aim:

To show that Binomial distribution variance is less than mean with Binomial variable follows (7,1/4).

Data:

> n=7

> p=1/4

Syntax:

> x=dbinom(0:7,n,p)

> x

> Ex=sum(x*p)

> Ex

> var=sum((x-Ex)^2*x)

> var

Output:

```
> n=7
> p=1/4
> x=dbinom(0:7,n,p)
> x
[1] 1.334839e-01 3.114624e-01 3.114624e-01 1.730347e-01 5.767822e-02
[6] 1.153564e-02 1.281738e-03 6.103516e-05
> Ex=sum(x*p)
> Ex
[1] 0.25
> var=sum((x-Ex)^2*x)
> var
[1] 0.008062817
```

Conclusion:

Thus we can conclude that the Binomial distribution variance is less than mean with Binomial variable follows (7,1/4).

3.

Poisson Distribution

Aim:

To check the relationship between mean and variance in Poisson distribution(4) with n=100.

Data:

> X.val=0:100

Syntax:

> P.val=dpois(X.val,4)

> EX=sum(X.val*P.val)

> EX

> sum((X.val-EX)^2*P.val)

Output:

```
Rscript /tmp/b5JvNSLg1R.r
[1] 4
[1] 4
```

Conclusion:

The relationship between mean and variance in Poisson distribution(4) with n=100 is checked.

4.

Normal Distribution

Aim:

Draw another normal curve, use a mean=50 and a standard deviation=10.

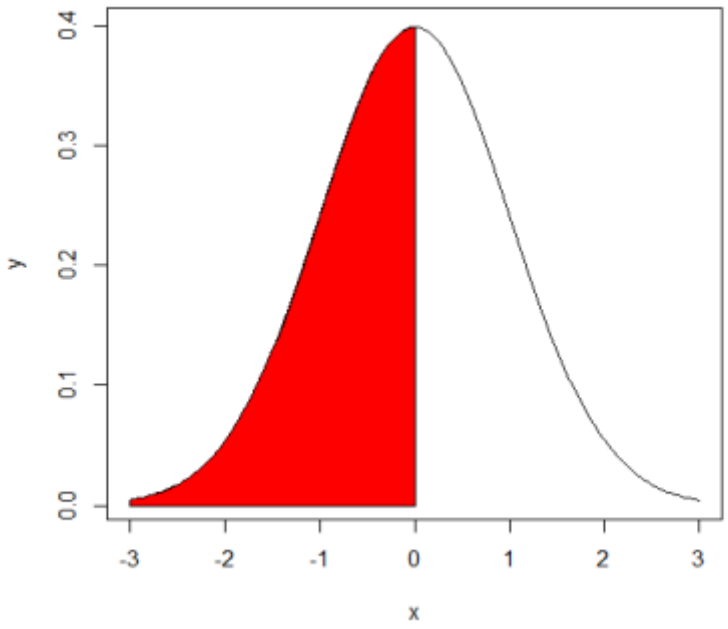
Data:

```
>x=seq(20,80,length=200)
>y=dnorm(x,mean=50,sd=10)
```

Syntax:

```
>plot(x,y,type="l")
>x=seq(-3,3,length=200)
>y=dnorm(x,mean=0,sd=1)
>plot(x,y,type="l")
>x=seq(-3,0,length=100)
>y=dnorm(x,mean=0,sd=1)
>polygon(c(-3,x,0),c(0,y,0),col="red")
>pnorm(0,mean=0,sd=1)
```

Output:



Conclusion:

The standard normal distribution curve is plotted for the given sequence and range.