**Record Writing**

**Experiment - I**

**Binomial Distribution**

**Problem 1:**Two dice are thrown 5 times, find the probability of getting 7 as sum (i) at least once (ii) two times P(X=2) (iii) P(1<X<5)

**Aim:-** To find the probabilities of getting 7 as sum (i) at least once (ii) two times (iii) P(1<X<5) (vi) P(X<=4)

**Formula:-**

The probability mass function of Binomial distribution is

, x = 0,1,2,3,…..n, p,q>0

S={(1,6),(2,5),(3,4),(4,3),(5,2),(6,1)}

N(S)=6

p=36/6=1/6

q=1-p=1-1/6=5/6

n=number of times thrown=5

1. =

**R-Command for Binomial distribution**: **dbinorm(x,n,p**)

**R Command (i):**

x<- 0

>x

0

n<- 5

>n

5

p<- 1/6

>p

0.166

**Bp<- dbinom(x, n, p)**

>**Bp**

**0.4018776**

**ans<- 1- Bp**

>**ans**

0.5981224

**R Command (ii):**

x<- 2

>x

2

n<- 5

>n

5

p<- 1/6

>p

1/6

**ans<- dbinom(x, n, p)**

**ans**

**0.16075**

**R Command(iii) :**

x<- c(2:4)

>x

2 3 4

n<- 5

>n

5

p<- 1/6

>p

0.1666667

**Bp<- dbinom(x, n, p)**

**Bp**

**0.160751029 0.032150206 0.003215021**

**ans<- sum(dbinom(x, n, p)**

ans

0.1961163

**R Command**

(vi)

x<- 4

>x

4

n<- 5

>n

5

p<- 1/6

>p

0.1666667

> ans1=pbinom(x, n, p)

> ans1

**0.9998714**

OR

x=<- c(0:4)

> x

0 1 2 3 4

n<- 5

>n

5

p<- 1/6

>p

0.1666667

> Bp=dbinom(x, n, p)

> Bp

0.401877572 0.401877572 0.160751029 0.032150206 0.003215021

> ans2=sum(Bp)

> ans2

**0.9998714**

**Final Output:**

1. Probability of getting 7 as sum at least once is P(X≥1) = 0.5981224
2. Probability of getting 7 as sum two times P(X=2) is 0.16075
3. P(1<X<5) = 0.1961163
4. P(X)= 0.9998714

**Problem 2** Fit a Binomial Distribution to the following data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| x | 0 | 1 | 2 | 3 | 4 | 5 |
| f | 2 | 14 | 20 | 34 | 22 | 8 |

Solutions: Here n=5,and N= = 2+14+20+34+22+8=100

Mean = = = 2.84

Mean of the binomial distribution = np =5p=2.84

P= = 0.568, q = 1-p=0.432

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x | Observed frequency  f | Probability  P(x) | Expected or Theoretical frequency  f(x) =N.P(x) | Round the Expected or Theoretical frequency |
| 0 | 2 | P(0) = 5c0(0.432)5 | f(0) = 100.p(0) =100(0.015)=1.5 | 2 |
| 1 | 14 | P(1) = 5c1(0.432)4(0.568) | f(1) = 100.p(1) =100(0.0989)=9.89 | 10 |
| 2 | 20 | P(2) = 5c2(0.432)3(0.568)2 | f(2) = 100.p(2) =100(0.260)=26 | 26 |
| 3 | 34 | P(3) = 5c3(0.432)2(0.568)3 | f(3) = 100.p(3) =100(0.341)=34.1 | 34 |
| 4 | 22 | P(4) = 5c4(0.432) (0.568)4 | f(4) = 100.p(4) =100(0.224)=22.4 | 22 |
| 5 | 8 | P(5) = 5c5(0.568)5 | f(5) = 100.p(5) =100(0.059)=5.9 | 6 |

**Expected or Theoretical frequency are 2,10,26,34,22,6**

**R- Command:**

> x<-c(0:5)

> x

[1] 0 1 2 3 4 5

> f<-c(2,14,20,34,22,8)

> f

2 14 20 34 22 8

> sum(x\*f)

284

> mu<-sum(x\*f)/sum(f)

> mu

2.84

p<-c(mu/5)

> p

0.568

n<- 5

>n

5

ans<-dbinom(x,n,p)\*sum(f)

> ans

1.504592 9.891299 26.010453 34.198929 22.482629 5.912099

> round(ans )

2 10 26 34 22 6

**Final Output:**

2 10 26 34 22 6