Experiment - 5

Fitting the probability distributions: Binomial distribution

Aim: To understand discrete probability distribution using R

Introduction:
A discrete distribution is one in which the data can only take on certain values, for example integers. For a discrete distribution, probabilities can be assigned to the values in the distribution. These distributions model the probabilities of random variables that can have discrete values as outcomes. Example: Binomial distribution, Poisson distribution

A binomial distribution is a discrete probability distribution that gives the success probability in n Bernoulli trials. The probability of getting a success is given by p. It is represented as X ~ Binomial(n, p). The pmf is given as follows:

$$P(X = x) = nC_x p^x (1-p)^{n-x}, \qquad x = 0,1,2,\dots,n$$

Procedure:

- Input/Import the data set
- Determine the probabilities of the random variable using Binomial distribution in R
- Visualize the probability distribution using R functions

Problem:
Four coins are tossed simultaneously. What is the probability of getting (i) 2 heads (ii) atleast 2 heads (iii) atmost 2 heads (iv) Expectation of x (v) Variance of x (vi) Visualize the probability distribution

Code and Results:

```
# number of trials
n=4
n
```

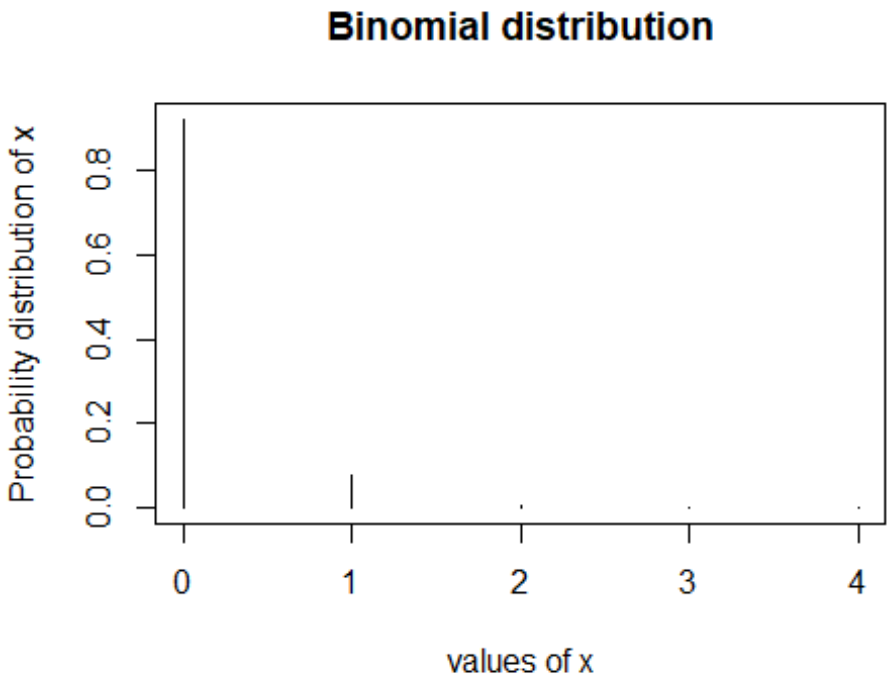
```
## [1] 4
```

```
#probability of success
p=0.02
p
```

```
## [1] 0.02
```

```
# (i) probability of getting exactly 2 heads
dbinom(2,n,p)
```

```
## [1] 0.00230496

# (ii) probability of getting atleast 2 heads
sum(dbinom(2:4,n,p))

## [1] 0.00233648

#or
1-pbinom(1,n,p)

## [1] 0.00233648

# (iii) probability of getting atmost 2 heads
sum(dbinom(0:2,n,p))

## [1] 0.9999685

# or
pbinom(2,n,p)

## [1] 0.9999685

#(iv) Expectation of x
x=0:n
px=dbinom(x,n,p)
Ex=weighted.mean(x,px)
Ex

## [1] 0.08

# (v) variance of x
Varx=weighted.mean(x*x,px)-(weighted.mean(x ,px))^2
Varx

## [1] 0.0784

# (vi) Visualize probability distribution
plot(x,px,type="h",xlab="values of x",ylab="Probability distribution of
x",main="Binomial distribution")
```



Conclusion: Suitable R functions have been explored to understand Binomial distribution.