**Binomial Distribution:**

Q1.10 unbiased coins are tossed simultaneously ,find the probability that there will be i) exactly 5 heads ii) At least 8 heads iii) not more than 3 heads iv) At least one head. V) If this exercise is carried out 50 times, how many times we can get exactly 5 heads?

Q2. The mean and variance of a Binomial distribution are 3 and 2 respectively. Find the probability that the variant takes values i) exactly 2.ii) at most 2.

Q3. The incidence of a certain disease is such that on average, 20% of workers suffer from it. If 10 workers are selected at random find the probability that

1. Exactly 2 workers suffer from the disease
2. Not more than 2 workers suffer from the disease
3. At least 9 workers suffer from the disease.

dbinom()

This function gives the probability density distribution at each point.

Create a sample of 50 numbers which are incremented by 1.

x <- seq(0,50,by = 1)

# Create the binomial distribution.

y <- dbinom(x,50,0.5)

# Give the chart file a name.

png(file = "dbinom.png")

# Plot the graph for this sample.

plot(x,y)

# Save the file.

dev.off()

pbinom()

This function gives the cumulative probability of an event. It is a single value representing the probability.

Probability of getting 26 or less heads from a 51 tosses of a coin.

x <- pbinom(26,51,0.5)

print(x)

qbinom()

This function takes the probability value and gives a number whose cumulative value matches the probability value.

How many heads will have a probability of 0.25 will come out when a coin

# is tossed 51 times.

x <- qbinom(0.25,51,1/2)

rbinom()

This function generates required number of random values of given probability from a given sample.

Find 8 random values from a sample of 150 with probability of 0.4.

x <- rbinom(8,150,.4)

print(x)

help(pbinom)

> ?dbinom

> #x=3

> dbinom(x=3,size=20,prob=1/6)

[1] 0.2378866

> #P(x=0) & P(X=1)&.....P(X=3)

> dbinom(x=0:3,size=20,prob=1/6)

[1] 0.02608405 0.10433621 0.19823881 0.23788657

> # P(X<=3)

> sum(dbinom(x=0:3,size=20,prob=1/6))

[1] 0.5665456

>

> pbinom(q=3,size=20,prob=1/6,lower.tail = T)

[1] 0.5665456

> rbinom(10,size=20,prob=0.05)

[1] 1 1 0 3 1 3 1 0 0 3

> rbinom(10,size=20,prob=0.05)

[1] 0 0 1 0 2 1 0 2 2 1

> rbinom(10,size=20,prob=0.15)

[1] 4 3 2 1 2 1 3 3 2 4

> set.seed(1234);rbinom(10,size=20,prob=0.15)

[1] 1 3 3 3 5 3 0 2 4 3

> set.seed(1234);rbinom(10,size=20,prob=0.15)

[1] 1 3 3 3 5 3 0 2 4 3

**Poisson distribution:**

Q1. If 5% of electric bulbs manufactured by a company are defective, Use Poisson Distribution to find the probability that in a box of 100 bulbs .i) None is defective ii) 3 bulbs are defective iii) More than 3 bulbs are defectives (given= e -5 = 0.007

Q2. In a certain factory turning out razor blades, there is a small chance 1/500 for any blade to be defective. The blades are supplied in a packet of 10. Use Poisson distribution to calculate approximately, the number of packets containing

1. No defectives ii) Two defectives blades, in a consignment of 10,000 packets.

help(dpois)

?dpois

**dpois()**

This function is used for illustration of Poisson density in an R plot. The function dpois() calculates the probability of a random variable that is available within a certain range.

**Syntax:**  
Syntax:

dpois(k, lambda, log)

where,

K: number of successful events happened in an interval

\lambda: mean per interval

log: If TRUE then the function returns probability in form of log

**ppois()**

This function is used for the illustration of cumulative probability function in an R plot. The function ppois() calculates the probability of a random variable that will be equal to or less than a number.

**syntax:**

**ppois(q, lambda, lower.tail, log)**

**K: number of successful events happened in an interval**

**\lambda: mean per interval**

**lower.tail: If TRUE then left tail is considered otherwise if the FALSE right tail is considered**

**log: If TRUE then the function returns probability in form of log**

**rpois()**

**The function rpois() is used for generating random numbers from a given Poisson’s distribution.**

**q: number of randon numbers needed**

**\lambda: mean per interval**

**qpois()**

**The function qpois() is used for generating quantile of a given Poisson’s distribution. In probability, quantiles are marked points that divide the graph of a probability distribution into intervals (continuous ) which have equal probabilities.**

**Syntax:**

**qpois(q, lambda, lower.tail, log)**

**K: number of successful events happened in an interval**

**lambda: mean per interval**

**lower.tail: If TRUE then left tail is considered otherwise if the FALSE right tail is considered**

**log: If TRUE then the function returns probability in form of log**

# P(X=4)

> dpois(x=2,lambda=5)

[1] 0.08422434

> dpois(x=0,lambda=5)

[1] 0.006737947

> dpois(x=0:5,lambda = 5)

[1] 0.006737947 0.033689735 0.084224337 0.140373896 0.175467370 0.175467370

# P(X<=4)

> sum(dpois(x=0:4,lambda = 5))

[1] 0.4404933

# P(X<=4)

ppois(q=4,lambda=5,lower.tail = T)

[1] 0.4404933

#P(X>=12)

> ppois(q=12,lambda=5,lower.tail = F)

[1] 0.002018852

**# rpois command : to take a random sample from a poison distribution.**

rpois(10,lambda=5)

[1] 7 3 4 4 5 5 5 7 6 5

**Normal Distribution:**

Q1. The weekly wages of 1000 workers are normally distributed around a mean of Rs 70. and standard deviation of Rs 5. Estimate the number of workers whose weekly wages will be ;   
i) between Rs 70 and 72. ii) between Rs 69 and 72. iii) More than Rs. 75   
 iv) Less than Rs 63 v) Also estimate the lowest weekly wages of the 100 highest paid workers,

Q2. In a sample of 1000 scores, the mean of a certain test is 14 and the standard deviation is 2.5 .Assuming the distribution is normal . Find

1. How many students scored b/w 12 and 15.
2. How many scored above 18?
3. How many scored below 8
4. How many scored 16?

help(pnorm)

> ?pnorm

pnorm(q=70,mean=75,sd=5,lower.tail = T)

[1] 0.1586553

pnorm(q=85,mean=75,sd=5,lower.tail = F)

[1] 0.02275013

> P(Z>=1)

pnorm(q=1,mean=0,sd=1,lower.tail = F)

[1] 0.1586553

Find Q1

qnorm(p=0.25,mean=75,sd=5,lower.tail = T)

[1] 71.62755