Simulation of Binomial Random Variable

- *rbinom(n, size, prob)*
- *dbinom(x, size, prob, log = FALSE)*
- *pbinom(q, size, prob, lower.tail = TRUE, log.p = FALSE)*
- *qbinom(p, size, prob, lower.tail = TRUE, log.p = FALSE)*

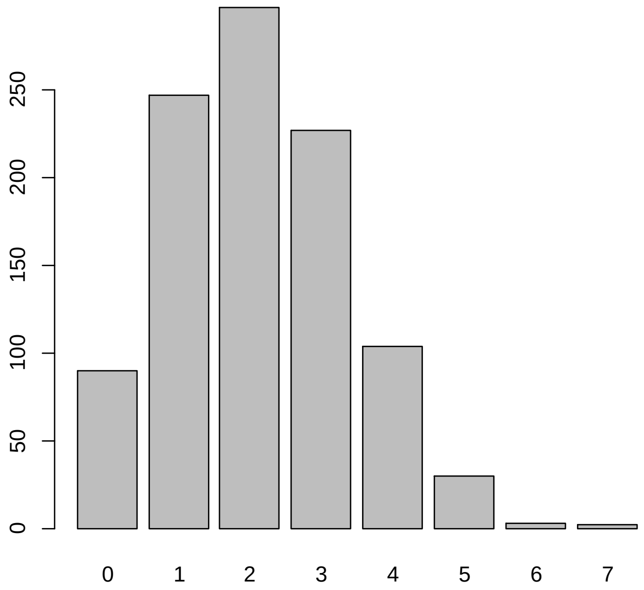
Generate 25 binomial random numbers with parameters n = 10 and p = 0.6.

```
> rbinom(25, 10, 0.6)
 [1] 7 6 8 8 5 6 8 7 7 7 7 6 5 5 7 7 5 3 6 7 7 8 7 9 6
```

Assign 1000 independent binomial numbers with parameters n = 7 and p = 0.3 to a vector object called V.

```
> V <- rbinom(1000, 7, 0.3)
> barplot(table(V))
```

Generate 25 binomial random numbers with parameters n = 10 and p = 0.6.

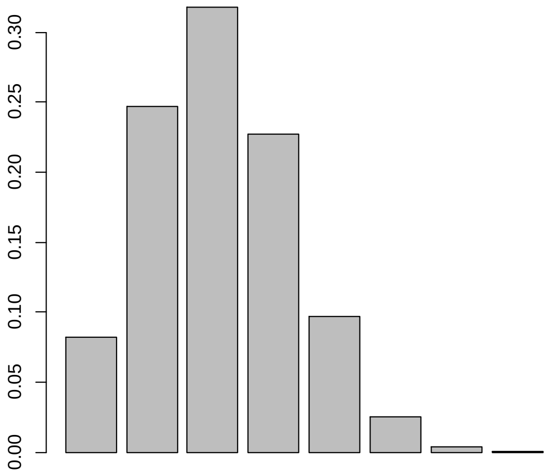


Calculate the binomial distribution using the dbinom() function.

```
> dbinom(0:7,7,0.3)
[1] 0.0823543 0.2470629 0.3176523 0.2268945 0.0972405 0.0250047 0.0035721
[8] 0.0002187
```

Plot the binomial distribution.

```
> barplot(dbinom(0:7,7,0.3))
```

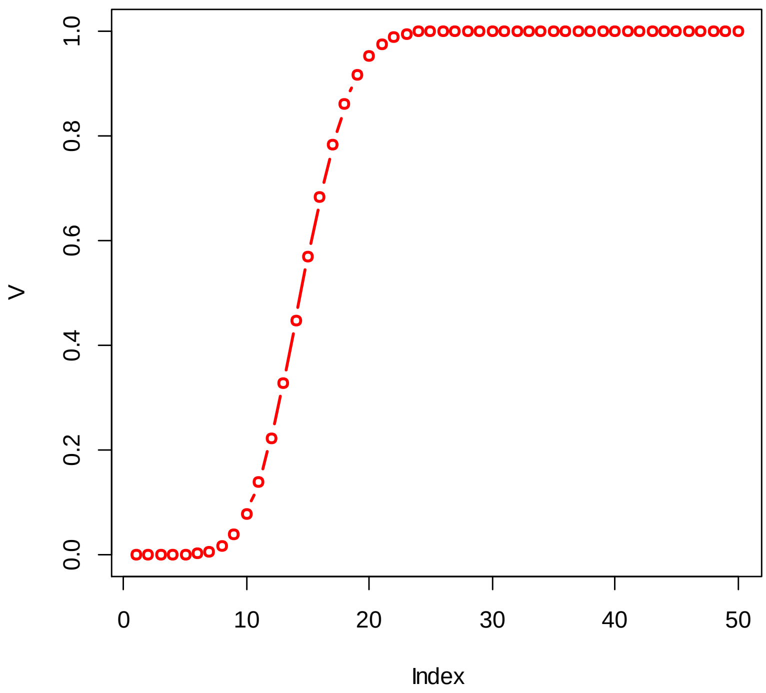


Calculate the cumulative probability distribution function.

```
> pbinom(24,50,0.5)
[1] 0.4438624

> V=pbinom(1:50,50, 0.3)
> V
 [1] 4.033700e-07 4.449916e-06 3.219766e-05 1.719274e-04 7.228617e-04
 [6] 2.493722e-03 7.264203e-03 1.825335e-02 4.023163e-02 7.885062e-02
[11] 1.390361e-01 2.228658e-01 3.278832e-01 4.468316e-01 5.691784e-01
[16] 6.838786e-01 7.821931e-01 8.594401e-01 9.151974e-01 9.522362e-01
[21] 9.749130e-01 9.877239e-01 9.944078e-01 9.976305e-01 9.990668e-01
[26] 9.996587e-01 9.998842e-01 9.999636e-01 9.999894e-01 9.999972e-01
[31] 9.999993e-01 9.999998e-01 1.000000e+00 1.000000e+00 1.000000e+00
[36] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
[41] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
[46] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00

> plot(V, type="b", col="red", lwd=2)
```



The inverse cumulative probability distribution function:

> qbinom(0.5,51,0.5)

[1] 25

Simulation of The Poisson Distribution

- *rpois(n, lambda)*
- *dpois(x, lambda, log = FALSE)*
- *ppois(q, lambda, lower.tail = TRUE, log.p = FALSE)*
- *qpois(p, lambda, lower.tail = TRUE, log.p = FALSE)*

Generate random numbers using the Poisson distribution

> rpois(100,3)

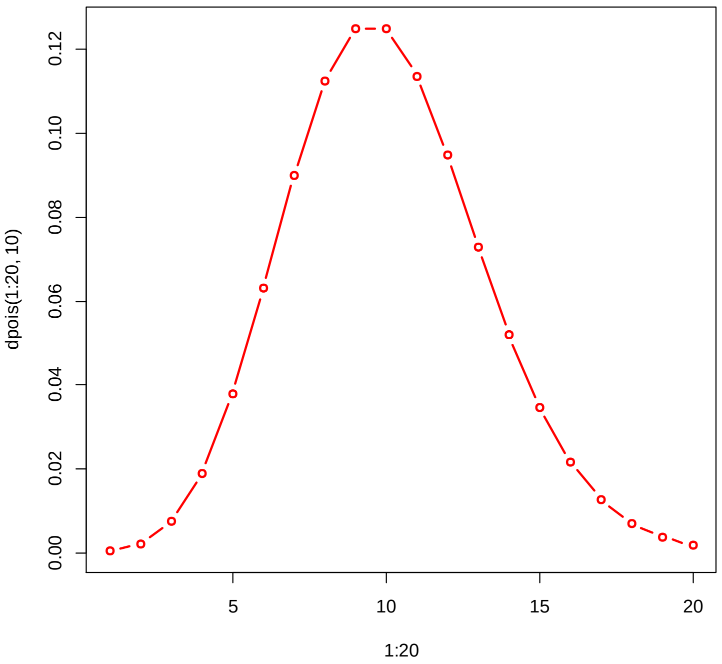
```
  [1] 1 5 2 4 2 1 1 3 5 1 3 2 3 1 3 2 6 4 2 2 0 5 1 4 6 1 2 3 1 3 5 3 5 0 8 0 3
 [38] 2 1 8 4 1 3 2 3 4 4 2 3 0 5 2 1 4 5 4 5 5 6 2 2 2 6 1 2 0 4 2 1 2 1 2 4 2
 [75] 3 2 4 4 5 3 3 3 3 3 3 4 1 2 4 7 2 2 2 5 4 4 2 1 3 4
```

Calculate the Poisson Distribution

> dpois(8,10)

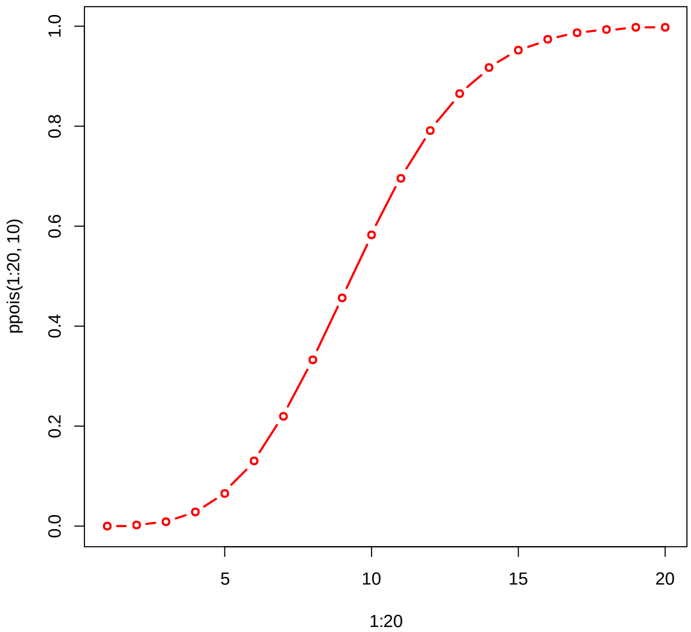
[1] 0.112599

> plot(1:20,dpois(1:20,10),type="b",col="red",lwd=2)



Calculate the cumulative probability distribution function of the Poisson Distribution.

> plot(1:20,ppois(1:20,10),type="b",col="red",lwd=2)



The inverse cumulative probability distribution function:

> qpois(0.5,10)

[1] 10