

BINOMIAL DISTRIBUTION

Code:

```
RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function Addins
R6.R x
Source on Save Run Source
19 #q1: For a Binomial(n=10, p=1/6) random variable named X,
20 dbinom(2,10,1/6)
21 #Q2 Find the P(2) by using binomial probability formula
22 choose(10,2)*(1/6)^2*(5/6)^8
23 x=0:10
24 df1=dbinom(x,10,1/6)
25 df1
26 x=c(0:10)
27 df1=round(df1,4)
28 data.frame(x,df1)
29 plot(0:10,df1, type="b")
30 x=c(0:50)
31 y=dbinom(x,50,0.33)
32 plot(x,y)
33 # q5: For a Binomial(n=7,p=1/4) random variable named X,
34 #i. Compute the probability of two success
35 y=dbinom(2,7,1/4)
36 plot(x,y)
37 #ii. Compute the Probabilities for whole space
38 x=c(0:7)
39 y=dbinom(x,7,1/4)
40 y=round(y,4)
41 y
42 #iii. Display those probabilities in a table
43 data.frame(x=c(0:7),y)
44 #iv. Show the shape of this binomial Distribution
45 plot(0:7, dbinom(0:7,7,1/4), type="b")
46 #Suppose there are twelve multiple choice questions in an English class quiz. Each question has five possible answers, and only one of them is correct.
47 #if a student attempts to answer every question at random.
48 #find the probability of having four or less
49 #correct answers by random attempts, we apply
50 #the function dbinom with x = 0,...,4. #n=12, x=4, p= 1/5 (exactly 4)
51 y=dbinom(4,12,1/5)
52 y=round(y,4)
53 y
54 chance=dbinom(0:4,12,1/5)
55 chance
56 y=pbinom(4,12,1/5)
57 y
58 #HW 1
59 #If 10% of the screws produced by an automatic machine are
60 #defective, find the probability that out of 20 screws selected
61 #at random, there are
62 #(i) Exactly 2 defective
63 y=dbinom(2,20,1/10)
64 y=round(y,4)
65 y
66 #(ii) At least 2 defectives
67 y=pbinom(2,10,1/5,lower.tail = FALSE)
68 y=round(y,4)
69 y
70
71 #(iii) Between 1 and 3 defectives (inclusive)
72 y=dbinom(c(1:3),20,1/10)
73 y=round(y,4)
74 y
75
20:17 (Top Level) R Script
Console
```

1) Find the Probability of getting two 2's among ten dice and

2) Find the P(2) by using binomial probability formula

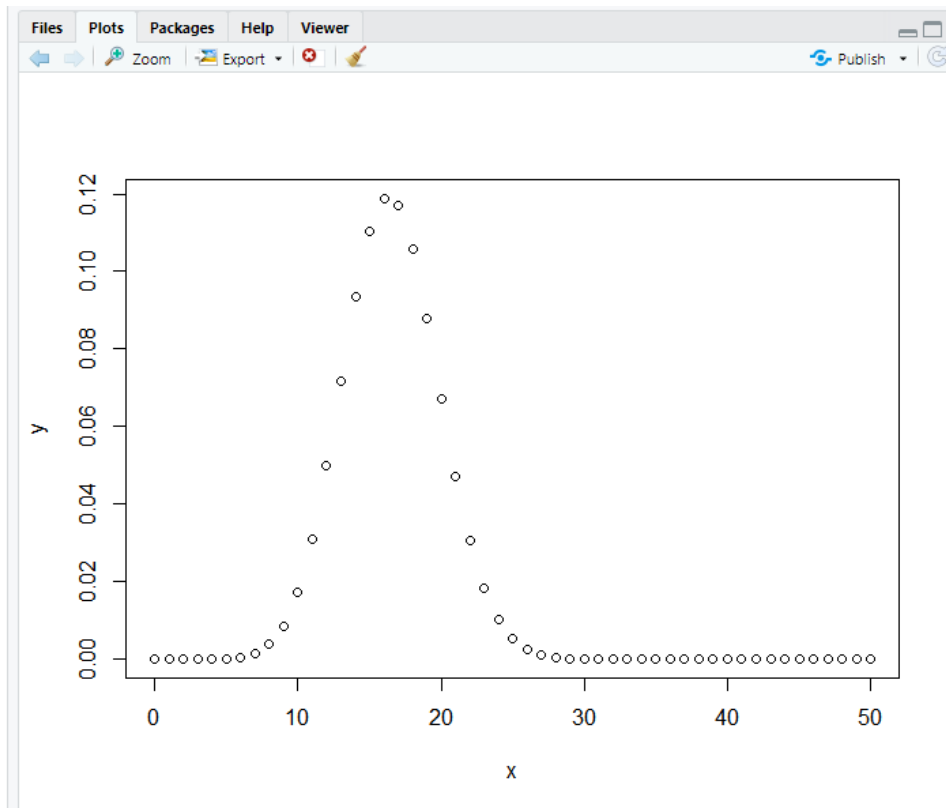
```
> y=dbinom(2,10,1/6)
> y=round(y,4)
> y
[1] 0.2907
> choose(10,2)*(1/6)^2*(5/6)^8
[1] 0.29071
> |
```

3) other functions

```
Type 'q()' to quit R.

[workspace loaded from ~/.RData]

> y=dbinom(2,10,1/6)
> y=round(y,4)
> y
[1] 0.2907
> choose(10,2)*(1/6)^2*(5/6)^8
[1] 0.29071
> x=0:10
> df1=dbinom(x,10,1/6)
> df1
[1] 1.615056e-01 3.230112e-01 2.907100e-01 1.550454e-01 5.426588e-02 1.302381e-02 2.170635e-03 2.480726e-04 1.860544e-05 8.269086e-07
[11] 1.653817e-08
> x=c(0:10)
> df1=round(df1,4)
> data.frame(x,df1)
  x    df1
1  0 0.1615
2  1 0.3230
3  2 0.2907
4  3 0.1550
5  4 0.0543
6  5 0.0130
7  6 0.0022
8  7 0.0002
9  8 0.0000
10 9 0.0000
11 10 0.0000
> plot(0:10,df1, type="b")
> x=c(0:50)
> y=dbinom(x,50,0.33)
> plot(x,y)
> |
```



4) For a Binomial($n=7, p=1/4$) random variable named X ,

#i. Compute the probability of two success

#ii. Compute the Probabilities for whole space

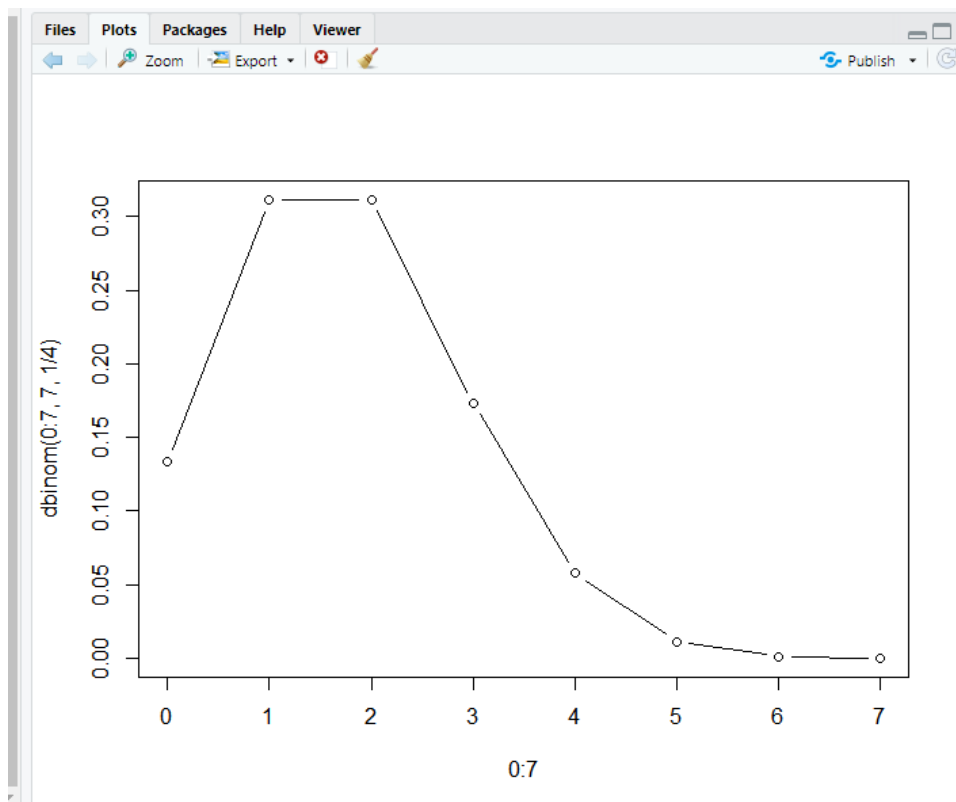
#iii. Display those probabilities in a table

#iv. Show the shape of this binomial Distribution

```

> y=dbinom(2,7,1/4)
> y=round(y,4)
> y
[1] 0.3115
> x=c(0:7)
> y=dbinom(x,7,1/4)
> y=round(y,4)
> y
[1] 0.1335 0.3115 0.3115 0.1730 0.0577 0.0115 0.0013 0.0001
> data.frame(x=c(0:7),1)
Error in data.frame(x = c(0:7), 1) : object '1' not found
> data.frame(x=c(0:7),y)
  x     y
1 0 0.1335
2 1 0.3115
3 2 0.3115
4 3 0.1730
5 4 0.0577
6 5 0.0115
7 6 0.0013
8 7 0.0001
> plot(0:7, dbinom(0:7,7,1/4), type="b")
.

```



5) Suppose there are twelve multiple choice questions in an English class quiz. Each question has five possible answers, and only one of them is correct. Find the probability of having four or less correct answers, if a student attempts to answer every question at random.

find the probability of having four or less correct answers by random attempts, we apply the function `dbinom` with $x = 0, \dots, 4$, $n=12$, $x=4$, $p=1/5$ (exactly 4)

```
> y=dbinom(4,12,1/5)
> y=round(y,4)
> y
[1] 0.1329
> chance=dbinom(0:4,12,1/5)
> chance
[1] 0.06871948 0.20615843 0.28346784 0.23622320 0.13287555
> y=pbinom(4,12,1/5)
> y
[1] 0.9274445
> |
```

6) If 10% of the Screws produced by an automatic machine are defective, find the probability that out of 20 screws selected at random, there are

(i) Exactly 2 defective, (ii) At least 2 defectives and (iii) Between 1 and 3 defectives (inclusive)

```
> y=dbinom(2,20,1/10)
> y=round(y,4)
> y
[1] 0.2852
> y=pbinom(2,20,1/10,lower.tail = FALSE)
> y=round(y,4)
> y
[1] 0.3222
> y=dbinom(c(1:3),20,1/10)
> y=round(y,4)
> y
[1] 0.2702 0.2852 0.1901
> |
```

Date:8/4/2021

Poisson distribution

Code:

```
27 #Poisson distribution with parameter 2
28 #1. How to obtain a sequence from 0 to 10
29 s.val=0:10
30 #2. Calculate P(0),P(1),...,P(10) when lambda =2 and Make the output prettier
31 p=dpois(s.val,2)
32 round(p,4)
33 #3. Find P(X <= 6)
34 ppois(6,2)
35 #4. Sum all probabilities
36 sum(p)
37 #5. Find P(X>6)
38 ppois(6,2,lower.tail = FALSE)
39 #6. Make a table of the first 11 Poisson probabilities and cumulative probabilities when lambda=2 and obtain the output prettier.
40 fx=cumsum(p)
41 p=dpois(s.val,2)
42 round(data.frame(fx,p),4)
43 #7. Plot the probabilities Put some labels on the axes and give the plot a title
44 plot(dpois(0:10,2),type='h',main='poisson probabilitiy',xlab = 'x-value',ylab='probability distribution')
```

Poisson distribution with parameter 2

1. How to obtain a sequence from 0 to 10

```
s.val=0:10
```

2. Calculate P(0),P(1),...,P(10) when lambda =2 and Make the output prettier.

```
> s.val=0:10
> p=dpois(s.val,2)
> round(p,4)
[1] 0.1353 0.2707 0.2707 0.1804 0.0902 0.0361 0.0120 0.0034 0.0009 0.0002 0.0000
```

3. Find $P(X \leq 6)$

4. Sum all probabilities

5. Find $P(X > 6)$

```
> ppois(6,2)
[1] 0.9954662
> sum(p)
[1] 0.9999917
> ppois(6,2,lower.tail = FALSE)
[1] 0.004533806
```

6. Make a table of the first 11 Poisson probabilities and cumulative probabilities when $\lambda=2$ and obtain the output prettier.

```
> fx=cumsum(p)
> p=dpois(s.val,2)
> round(data.frame(fx,p),4)
      fx      p
1 0.1353 0.1353
2 0.4060 0.2707
3 0.6767 0.2707
4 0.8571 0.1804
5 0.9473 0.0902
6 0.9834 0.0361
7 0.9955 0.0120
8 0.9989 0.0034
9 0.9998 0.0009
10 1.0000 0.0002
11 1.0000 0.0000
> |
```

7. Plot the probabilities Put some labels on the axes and give the plot a title

