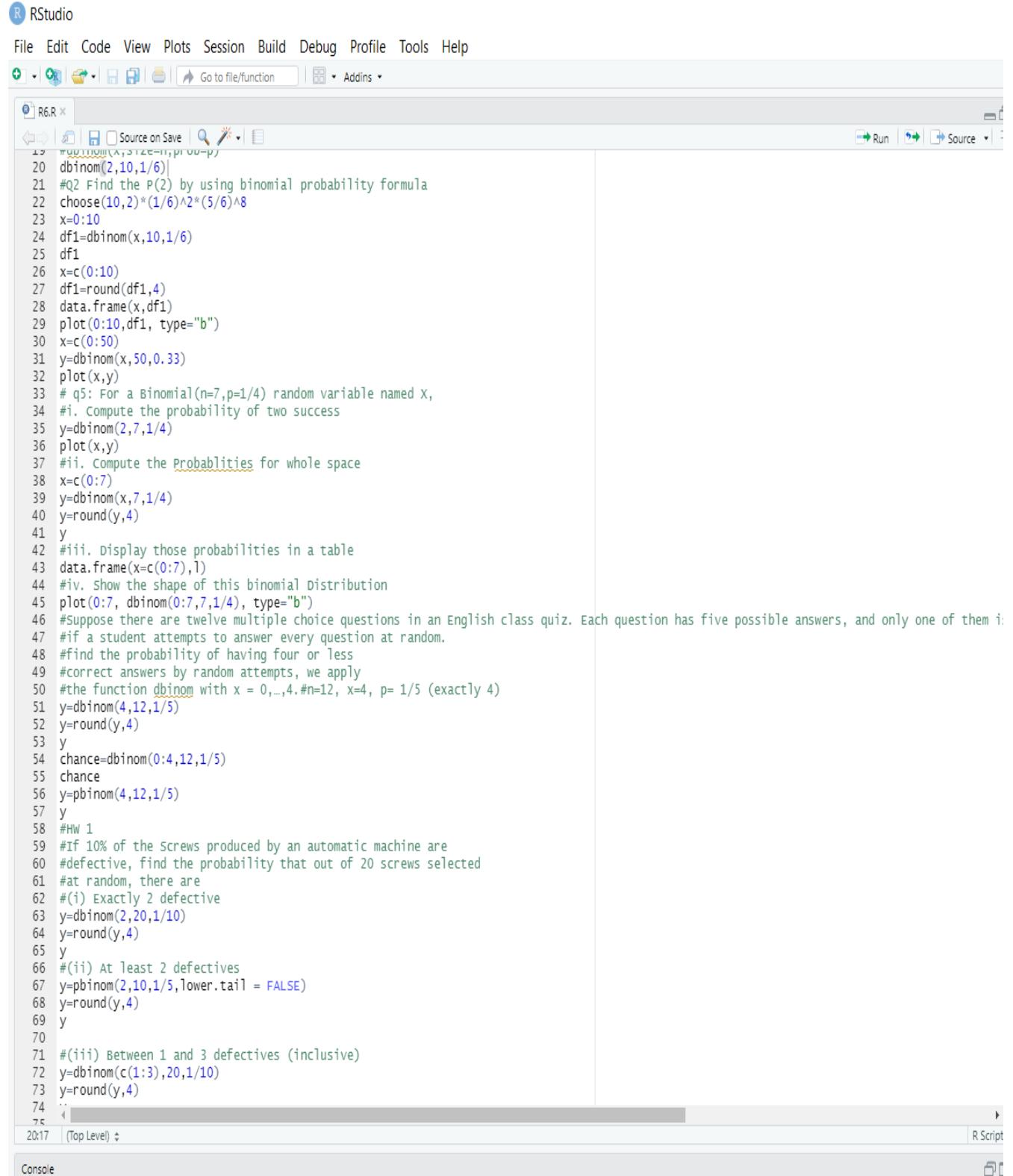


BINOMIAL DISTRIBUTION

Code:



The screenshot shows the RStudio interface with the following details:

- Header:** RStudio, File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, Help.
- Toolbar:** Standard RStudio icons for file operations like Open, Save, Print, and Run.
- Left Panel:** A tree view showing the current project structure with an R script named "R6.R".
- Code Editor:** The main area contains R code for various binomial distribution calculations. The code includes:
 - Calculating the probability of exactly 2 successes in 10 trials (line 20).
 - Plotting the binomial distribution for n=50 (lines 29-32).
 - Computing probabilities for a Binomial(n=7, p=1/4) random variable (lines 33-36).
 - Computing probabilities for the whole space of a Binomial(7, 1/4) random variable (lines 37-41).
 - Displaying those probabilities in a table (line 42).
 - Plotting the shape of the binomial distribution (line 44).
 - Supposing there are twelve multiple choice questions in an English class quiz (lines 45-51).
 - Computing the probability of having four or less correct answers (lines 52-56).
 - Computing the probability of getting exactly 4 correct answers (line 57).
 - Computing the probability of getting at least 2 defective screws (lines 58-62).
 - Computing the probability of getting at least 2 defectives (line 63).
 - Computing the probability of getting between 1 and 3 defectives (inclusive) (line 64).
 - Computing the probability of getting between 1 and 3 defectives (inclusive) (line 65).
 - Computing the probability of getting at least 2 defectives (line 66).
 - Computing the probability of getting at least 2 defectives (line 67).
 - Computing the probability of getting at least 2 defectives (line 68).
 - Computing the probability of getting at least 2 defectives (line 69).
 - Computing the probability of getting at least 2 defectives (line 70).
 - Computing the probability of getting at least 2 defectives (line 71).
 - Computing the probability of getting at least 2 defectives (line 72).
 - Computing the probability of getting at least 2 defectives (line 73).
 - Computing the probability of getting at least 2 defectives (line 74).
 - Computing the probability of getting at least 2 defectives (line 75).
- Bottom Status Bar:** Shows "20:17" and "(Top Level)".
- Bottom Right:** "R Script" tab.

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

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

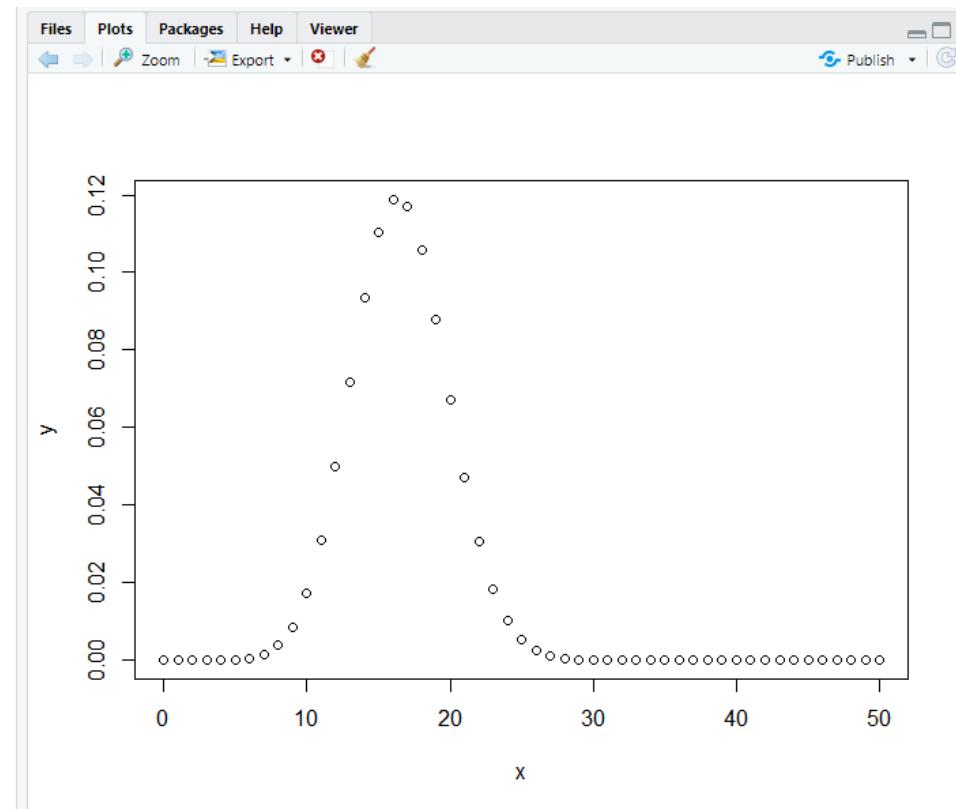
```
> y=dbinom(2,10,1/6)
> y=round(y,4)
> y
[1] 0.2907
> choose(10,2)*(1/6)^2*(5/6)^8
[1] 0.29071
> |
```

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)
> |
```



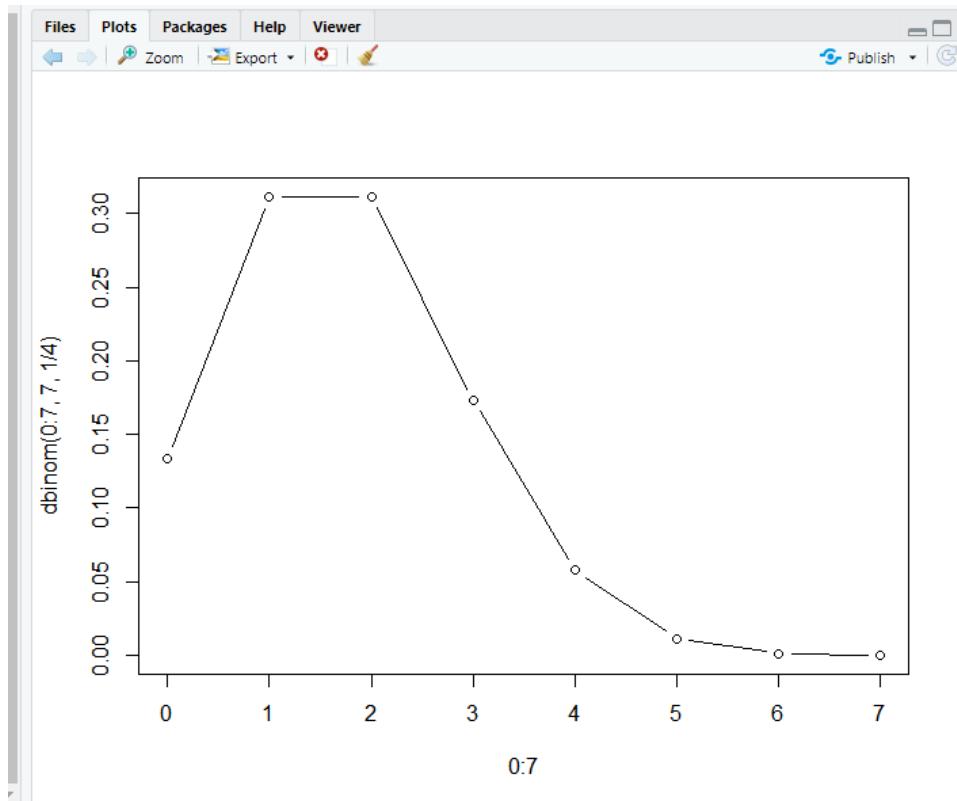
4)For a Binomial($n=7, p=1/4$) random variable named X,

- #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),l)
Error in data.frame(x = c(0:7), l) : object 'l' 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 $x = 0..4$, $n=12$, $x=4$, $p= 1/5$ (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(2,10,1/5,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 lamda=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 probability',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 lamda=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

