

Assignment-3

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3CS10

Que

(1) Roll 12 dice simultaneously, and let X denotes the number of 6's that appear. Calculate the probability of getting 7, 8 or 9, 6's using R. (Try using the function pbinom; If we set $S = \{\text{get a 6 on one roll}\}$, $P(S) = 1/6$ and the rolls constitute Bernoulli trials; thus $X \sim \text{binom}(\text{size}=12, \text{prob}=1/6)$ and we are looking for $P(7 \leq X \leq 9)$).

#by dbinom,

```
a=dbinom(7,size=12,prob=1/6)
```

```
b=dbinom(8,size=12,prob=1/6)
```

```
c=dbinom(9,size=12,prob=1/6)
```

```
result=a+b+c
```

```
print(result)
```

#by pbinom

```
d=pbinom(9,size=12,prob=1/6)
```

```
e=pbinom(6,size=12,prob=1/6)
```

```
result2=d-e
```

```
print(result2)
```

####

```
pro = pbinom(9,12,1/6)-pbinom(6,12,1/6)
```

```
print(pro)
```

The screenshot shows the R Studio environment with the following components:

- Script Editor:** Contains the R code for the assignment, including comments and function calls like `dbinom` and `pbinom`.
- Console:** Displays the output of the code execution, showing the results of the probability calculations.
- Environment:** A table listing the objects created in the R session, including variables like `p2`, `p3`, `p4`, `p5`, `PL`, `pr`, `pro`, `pro1`, `prob`, `result`, and `result2`.
- Files:** A list of files in the current directory, including `lghlogs.doc`, `RData`, `Rhistory`, `1 number pattern.cpp`, `1 number pattern.exe`, `2 point.bak`, `2 point.dwg`, `2 projection of points.pdf`, `Aarushi Gupta_102196005_2CS10_A...`, `Aarushi Gupta_102196005_2CS10_A...`, `assignment3 que5 part2.exe`, `assignment3 que6 part1.exe`, `acadterr`, `ADD_tiet.exe`, `ADD_tiet.exe`, and `ai content.txt`.

```
3 #by dbinom,
4 a=dbinom(7,size=12,prob=1/6)
5 b=dbinom(8,size=12,prob=1/6)
6 c=dbinom(9,size=12,prob=1/6)
7
8 result=a+b+c
9 print(result)
10
11
12
13 #by pbinom
14 d=pbinom(9,size=12,prob=1/6)
15 e=pbinom(6,size=12,prob=1/6)
16 result2=d-e
17 print(result2)
18
19 ####
20 pro = pbinom(9,12,1/6)-pbinom(6,12,1/6)
21 print(pro)
22
23
```

Console Output:

```
R 4.2.1 ~ /
> #by dbinom,
> a=dbinom(7,size=12,prob=1/6)
> b=dbinom(8,size=12,prob=1/6)
> c=dbinom(9,size=12,prob=1/6)
>
> result=a+b+c
> print(result)
[1] 0.001291758
>
> #by pbinom
> d=pbinom(9,size=12,prob=1/6)
> e=pbinom(6,size=12,prob=1/6)
> result2=d-e
> print(result2)
[1] 0.001291758
> ####
> pro = pbinom(9,12,1/6)-pbinom(6,12,1/6)
> print(pro)
[1] 0.001291758
> |
```

Object	Value
p2	0.0842243374885683
p3	0.140373895814281
p4	0.175467369767851
p5	0.175467369767851
PL	num [1:130] 1.4 1.4 1.4 1.3 1.5...
pr	0.537516690853148
pro	0.00129175754208255
pro1	0.00673794699908547
prob	0.369668172004079
result	0.00129175754208252
result2	0.00129175754208255

Que 2

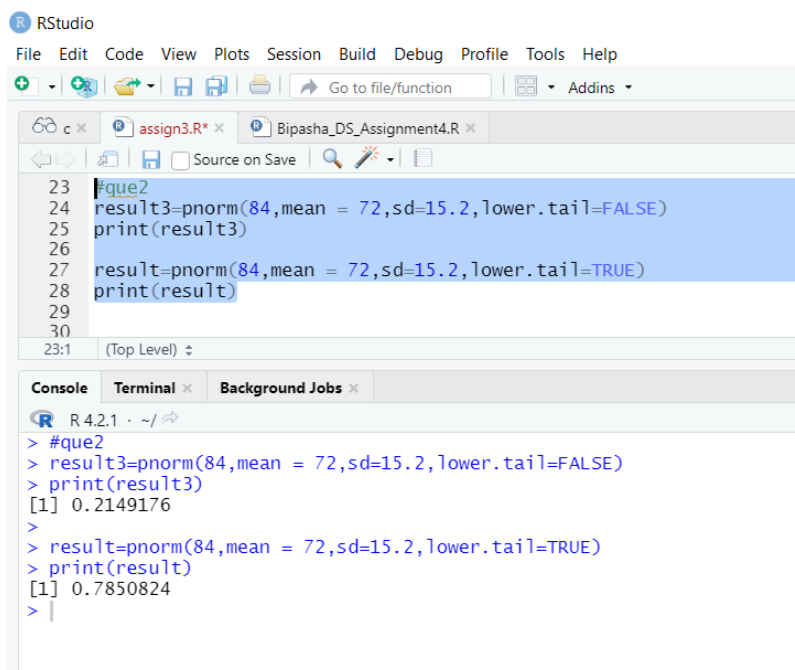
Assume that the test scores of a college entrance exam fits a normal distribution. Furthermore, the mean test score is 72, and the standard deviation is 15.2. What is the percentage of students scoring 84 or more in the exam?

```
result3=pnorm(84,mean = 72,sd=15.2,lower.tail=FALSE)

print(result3)

result=pnorm(84,mean = 72,sd=15.2,lower.tail=TRUE)

print(result)
```



The screenshot shows the RStudio interface. The script editor on the left contains the following code:

```
23 #que2
24 result3=pnorm(84,mean = 72,sd=15.2,lower.tail=FALSE)
25 print(result3)
26
27 result=pnorm(84,mean = 72,sd=15.2,lower.tail=TRUE)
28 print(result)
29
30
```

The console on the right shows the output of the code:

```
R 4.2.1 ~ /
> #que2
> result3=pnorm(84,mean = 72,sd=15.2,lower.tail=FALSE)
> print(result3)
[1] 0.2149176
>
> result=pnorm(84,mean = 72,sd=15.2,lower.tail=TRUE)
> print(result)
[1] 0.7850824
>
```

Que3

On the average, five cars arrive at a particular car wash every hour. Let X count the number of cars that arrive from 10AM to 11AM, then $X \sim \text{Poisson}(\lambda = 5)$. What is probability that no car arrives during this time. Next, suppose the car wash above is in operation from 8AM to 6PM, and we let Y be the number of customers that appear in this period. Since this period covers a total of 10 hours, we get that $Y \sim \text{Poisson}(\lambda = 5 \times 10 = 50)$. What is the probability that there are between 48 and 50 customers, inclusive?

#que 3

```
pro1 = dpois(0,5)

print(pro1)

pro = dpois(48,50)+dpois(49,50)+dpois(50,50)
```

```
print(pro)
prob=ppois(47,50)
pr=ppois(50,50)
ans=pr-prob
print (ans)
###
p= dpois (0,5)
print (p)
p1= dpois (1,5)
print (p1)
p2= dpois (2,5)
print (p2)
p3= dpois (3,5)
print (p3)
p4= dpois (4,5)
print (p4)
p5= dpois (5,5)
print (p)
a = p+p1+p2+p3+p4+p5
print (a)
```

```
RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function Addins

Source

Console Terminal Background Jobs

R 4.2.1 ~ /
> #que 3
> pro1 = dpois(0,5)
> print(pro1)
[1] 0.006737947
> pro = dpois(48,50)+dpois(49,50)+dpois(50,50)
> print(pro)
[1] 0.1678485
> prob=ppois(47,50)
> pr=ppois(50,50)
> ans=pr-prob
> print (ans)
[1] 0.1678485
> ###
> p= dpois (0,5)
> print (p)
[1] 0.006737947
> p1= dpois (1,5)
> print (p1)
[1] 0.03368973
> p2= dpois (2,5)
> print (p2)
[1] 0.08422434
> p3= dpois (3,5)
> print (p3)
[1] 0.1403739
> p4= dpois (4,5)
> print (p4)
[1] 0.1754674
> p5= dpois (5,5)
> print (p)
[1] 0.006737947
> a = p+p1+p2+p3+p4+p5
> print (a)
[1] 0.6159607
```

Que4

Suppose in a certain shipment of 250 Pentium processors there are 17 defective processors. A quality control consultant randomly collects 5 processors for inspection to determine whether or not they are defective. Let X denote the number of defectives in the sample. Find the probability of exactly 3 defectives in the sample, that is, find $P(X = 3)$.

`dhyper(3,17,250-17,5)`

```
56
57 #que 4
58 dhyper(3,17,250-17,5)
59
56:1 (Top Level)

Console Terminal Background Jobs

R 4.2.1 ~ /
> #que 4
> dhyper(3,17,250-17,5)
[1] 0.002351153
> |
```

Que5

A recent national study showed that approximately 44.7% of college students have used Wikipedia as a source in at least one of their term papers. Let X equal the number of students in a random sample of size $n = 31$ who have used Wikipedia as a source. (a) How is X distributed? (b) Sketch the probability mass function. (c) Sketch the cumulative distribution function. (d) Find mean, variance and standard deviation of X

```
pro=dbinom(1:31,31,447/1000)
```

```
e <- data.frame(x=1:31,pro)
```

```
print(e)
```

```
plot(e,type="l")
```

```
plot(e,type="h")
```

```
print(mean(pro))
```

```
print(sd(pro))
```

```
print(var(pro))
```

