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## **Tutorial: 5 - Probability Distribution Using R**

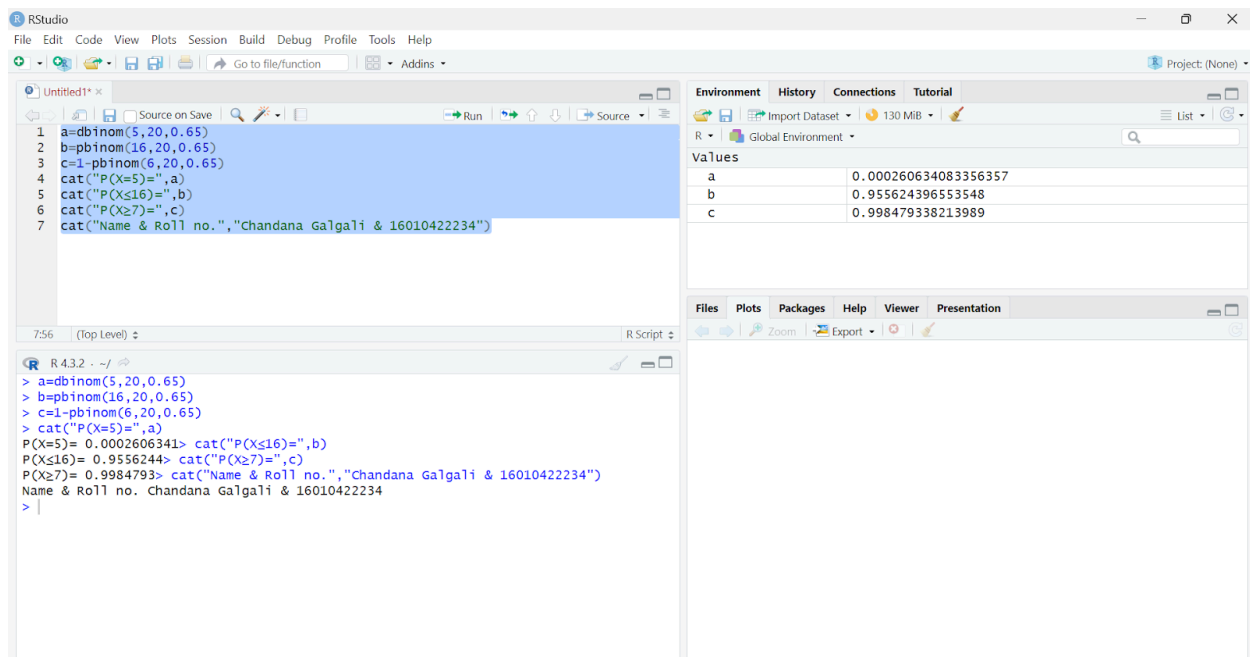
**Q.1 If X is Binomial Distribution  $B(n,p)$  where  $n=20$   $p=0.65$**

**Write R-program to evaluate and print (i)  $P(X=5)$  (ii)  $P(X \leq 16)$  (iii)  $P(X \geq 7)$**

### **Code on Rstudio**

```
a=dbinom(5,20,0.65)
b=pbinom(16,20,0.65)
c=1-pbinom(6,20,0.65)
cat("P(X=5)=",a)
cat("P(X≤16)=",b)
cat("P(X≥7)=",c)
cat("Name & Roll no.,"Chandana Galgali & 16010422234")
```

### **Output**



The screenshot shows the RStudio interface with the following components:

- Source Editor:** Contains the R code from the previous block, with lines 1-7 highlighted in blue.
- Environment:** Shows the 'Global Environment' with three variables: 'a' (0.000260634083356357), 'b' (0.955624396553548), and 'c' (0.998479338213989).
- Console:** Displays the execution output, including the probability values and the concatenated name and roll number.

```
R 4.3.2 ~ -/
> a=dbinom(5,20,0.65)
> b=pbinom(16,20,0.65)
> c=1-pbinom(6,20,0.65)
> cat("P(X=5)=",a)
P(X=5)= 0.0002606341> cat("P(X≤16)=",b)
P(X≤16)= 0.9556244> cat("P(X≥7)=",c)
P(X≥7)= 0.9984793> cat("Name & Roll no.,"Chandana Galgali & 16010422234")
Name & Roll no. Chandana Galgali & 16010422234
>
```

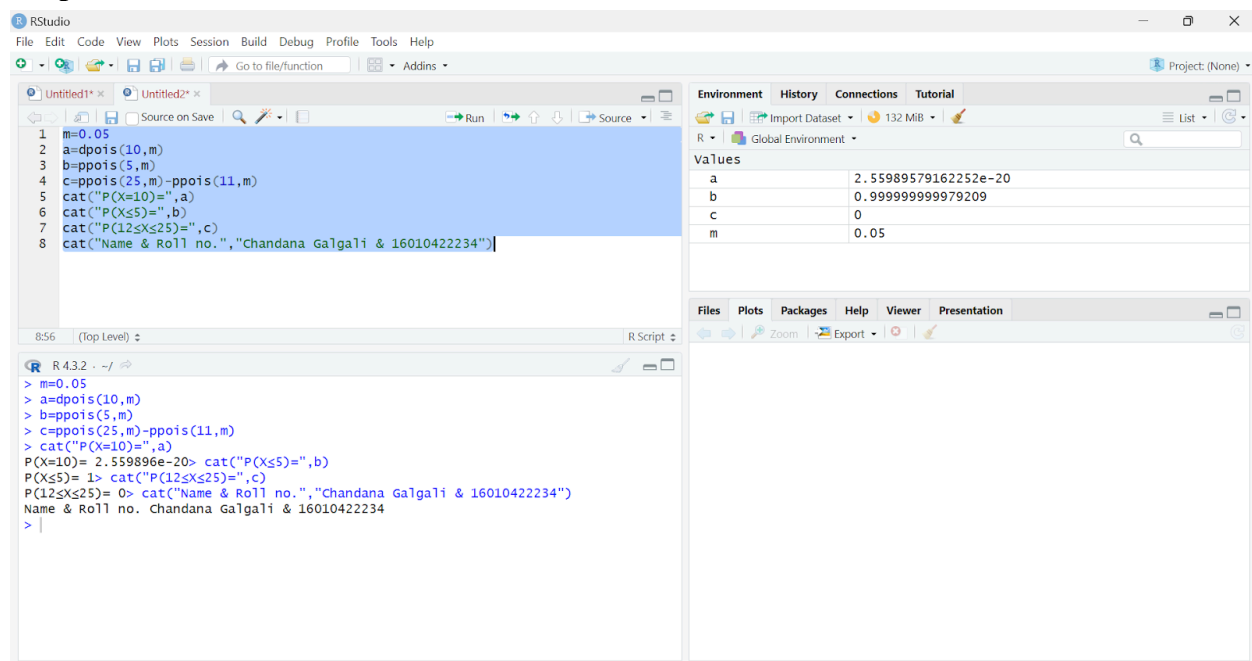
## Q.2 If X is Poisson Distribution with mean 0.05

Write R-program to evaluate and print (i)  $P(X=10)$  (ii)  $P(X \leq 5)$  (iii)  $P(12 \leq X \leq 25)$

### Code on Rstudio

```
m=0.05
a=dpois(10,m)
b=ppois(5,m)
c=ppois(25,m)-ppois(11,m)
cat("P(X=10)=",a)
cat("P(X≤5)=",b)
cat("P(12≤X≤25)=",c)
cat("Name & Roll no. ","Chandana Galgali & 16010422234")
```

### Output



The screenshot shows the RStudio interface with the following components:

- Source Editor:** Contains the R code from the previous block.
- Environment:** Shows the global environment with variables a, b, c, and m.
- Console:** Displays the output of the R code.

**Environment Panel:**

Variable	Value
a	2.55989579162252e-20
b	0.999999999979209
c	0
m	0.05

**Console Panel:**

```
> m=0.05
> a=dpois(10,m)
> b=ppois(5,m)
> c=ppois(25,m)-ppois(11,m)
> cat("P(X=10)=",a)
P(X=10)= 2.559896e-20> cat("P(X≤5)=",b)
P(X≤5)= 1> cat("P(12≤X≤25)=",c)
P(12≤X≤25)= 0> cat("Name & Roll no. ","Chandana Galgali & 16010422234")
Name & Roll no. Chandana Galgali & 16010422234
> |
```

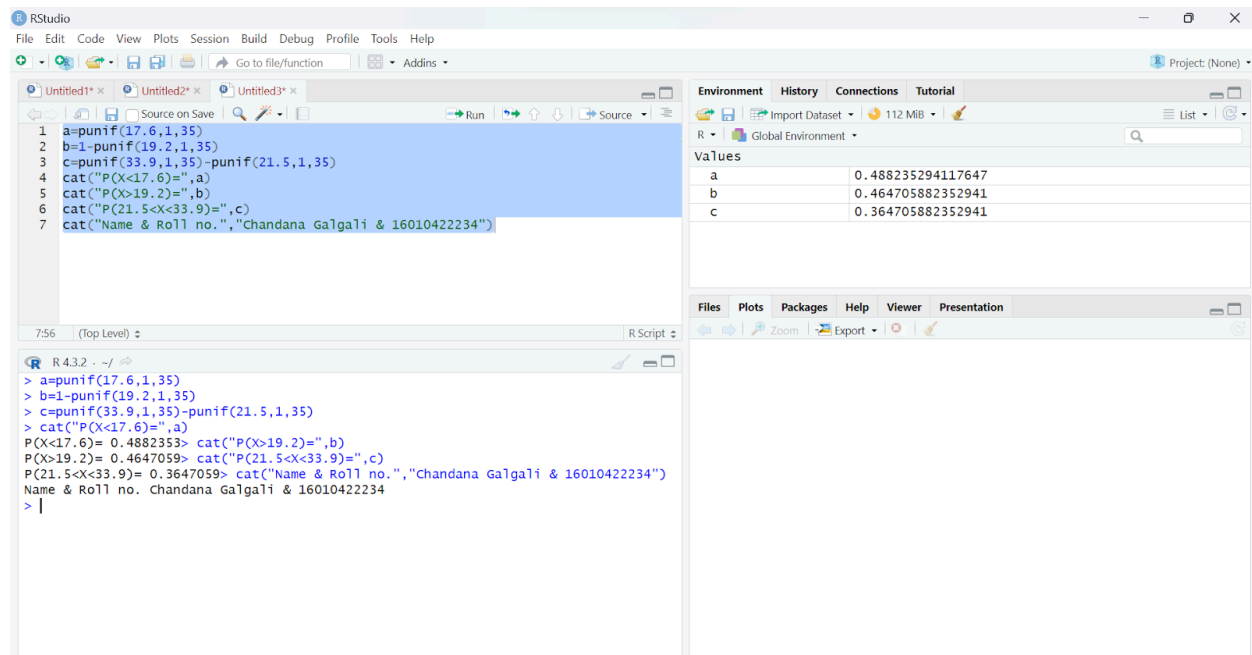
### Q.3 If X is Uniform Distribution over the range (1,35).

Write R-program to evaluate and print (i)  $P(X < 17.6)$  (ii)  $P(X > 19.2)$  (iii)  $P(21.5 < X < 33.9)$

#### Code on Rstudio

```
a=punif(17.6,1,35)
b=1-punif(19.2,1,35)
c=punif(33.9,1,35)-punif(21.5,1,35)
cat("P(X<17.6)=",a)
cat("P(X>19.2)=",b)
cat("P(21.5<X<33.9)=",c)
cat("Name & Roll no.,"Chandana Galgali & 16010422234")
```

#### Output



The screenshot shows the RStudio interface with the following components:

- Source Editor:** Contains the R code from the previous block.
- Environment:** Shows the global environment with variables a, b, and c.
- Console:** Displays the output of the R code.
- Values:** A table showing the values of variables a, b, and c.

Variable	Value
a	0.488235294117647
b	0.464705882352941
c	0.364705882352941

The console output is as follows:

```
R 4.3.2 ~-/  
> a=punif(17.6,1,35)  
> b=1-punif(19.2,1,35)  
> c=punif(33.9,1,35)-punif(21.5,1,35)  
> cat("P(X<17.6)=",a)  
P(X<17.6)= 0.4882353> cat("P(X>19.2)=",b)  
P(X>19.2)= 0.4647059> cat("P(21.5<X<33.9)=",c)  
P(21.5<X<33.9)= 0.3647059> cat("Name & Roll no.,"Chandana Galgali & 16010422234")  
Name & Roll no. Chandana Galgali & 16010422234  
> |
```

#### Q.4 If X is Exponential Distribution with mean 60.

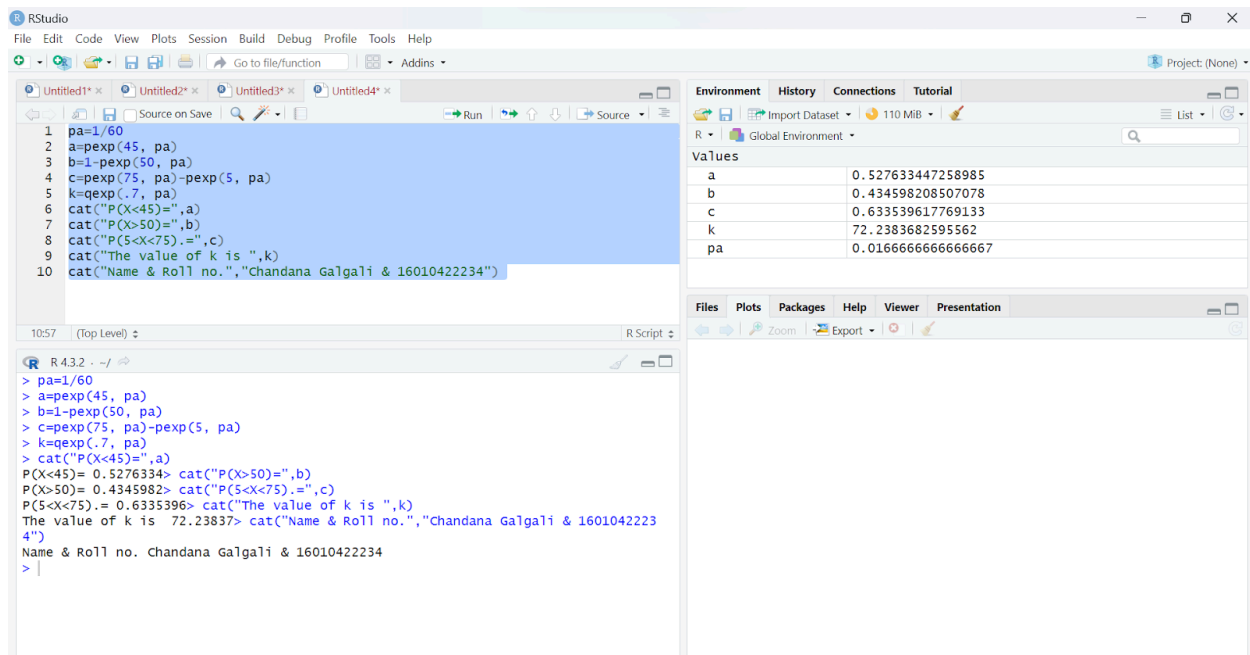
Write R-program to evaluate and print (i)  $P(X < 45)$  (ii)  $P(X > 50)$  (iii)  $P(5 < X < 75)$ .

Find value of k such that  $P(X < k) = 0.7$

#### Code on Rstudio

```
pa=1/60
a=pexp(45, pa)
b=1-pexp(50, pa)
c=pexp(75, pa)-pexp(5, pa)
k=qexp(.7, pa)
cat("P(X<45)=",a)
cat("P(X>50)=",b)
cat("P(5<X<75).=",c)
cat("The value of k is ",k)
cat("Name & Roll no. ","Chandana Galgali & 16010422234")
```

#### Output



The screenshot shows the RStudio interface with the following components:

- Source Editor:** Contains the R code from the previous block, with lines 1-10 highlighted in blue.
- Environment:** Shows the global environment with variables a, b, c, k, and pa. The values are: a = 0.527633447258985, b = 0.434598208507078, c = 0.633539617769133, k = 72.2383682595562, and pa = 0.0166666666666667.
- Console:** Shows the output of the R code, including the calculated probabilities and the name and roll number.

```
> pa=1/60
> a=pexp(45, pa)
> b=1-pexp(50, pa)
> c=pexp(75, pa)-pexp(5, pa)
> k=qexp(.7, pa)
> cat("P(X<45)=",a)
P(X<45)= 0.5276334
> cat("P(X>50)=",b)
P(X>50)= 0.4345982
> cat("P(5<X<75).=",c)
P(5<X<75).= 0.6335396
> cat("The value of k is ",k)
The value of k is 72.23837
> cat("Name & Roll no. ","Chandana Galgali & 16010422234")
Name & Roll no. Chandana Galgali & 16010422234
>
```

**Q.5 If X is Normal Distribution with mean 20 and standard deviation 5.**

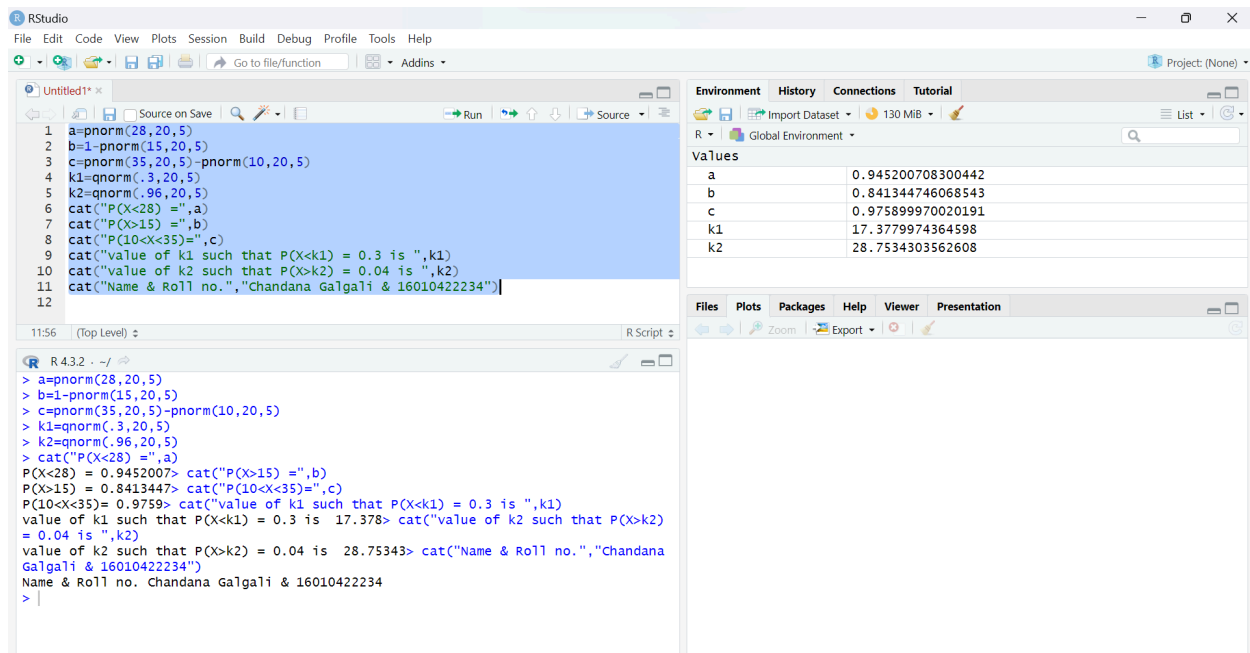
**Write R-program to evaluate and print (i)  $P(X < 28)$  (ii)  $P(X > 15)$  (iii)  $P(10 < X < 35)$ .**

**Find value of k1 such that  $P(X < k1) = 0.3$ . Also find k2 such that  $P(X > k2) = 0.04$**

### Code on Rstudio

```
a=pnorm(28,20,5)
b=1-pnorm(15,20,5)
c=pnorm(35,20,5)-pnorm(10,20,5)
k1=qnorm(.3,20,5)
k2=qnorm(.96,20,5)
cat("P(X<28) =",a)
cat("P(X>15) =",b)
cat("P(10<X<35)=",c)
cat("value of k1 such that P(X<k1) = 0.3 is ",k1)
cat("value of k2 such that P(X>k2) = 0.04 is ",k2)
cat("Name & Roll no.,"Chandana Galgali & 16010422234")
```

### Output



The screenshot shows the RStudio interface with the following components:

- Source Editor:** Contains the R code from the previous block, numbered 1 to 12.
- Environment Pane:** Displays the values of the variables created in the code:

Variable	Value
a	0.945200708300442
b	0.841344746068543
c	0.975899970020191
k1	17.3779974364598
k2	28.7534303562608
- Console:** Shows the execution output, including the printed values for a, b, c, k1, and k2, and the final cat statement output: "Name & Roll no. Chandana Galgali & 16010422234".