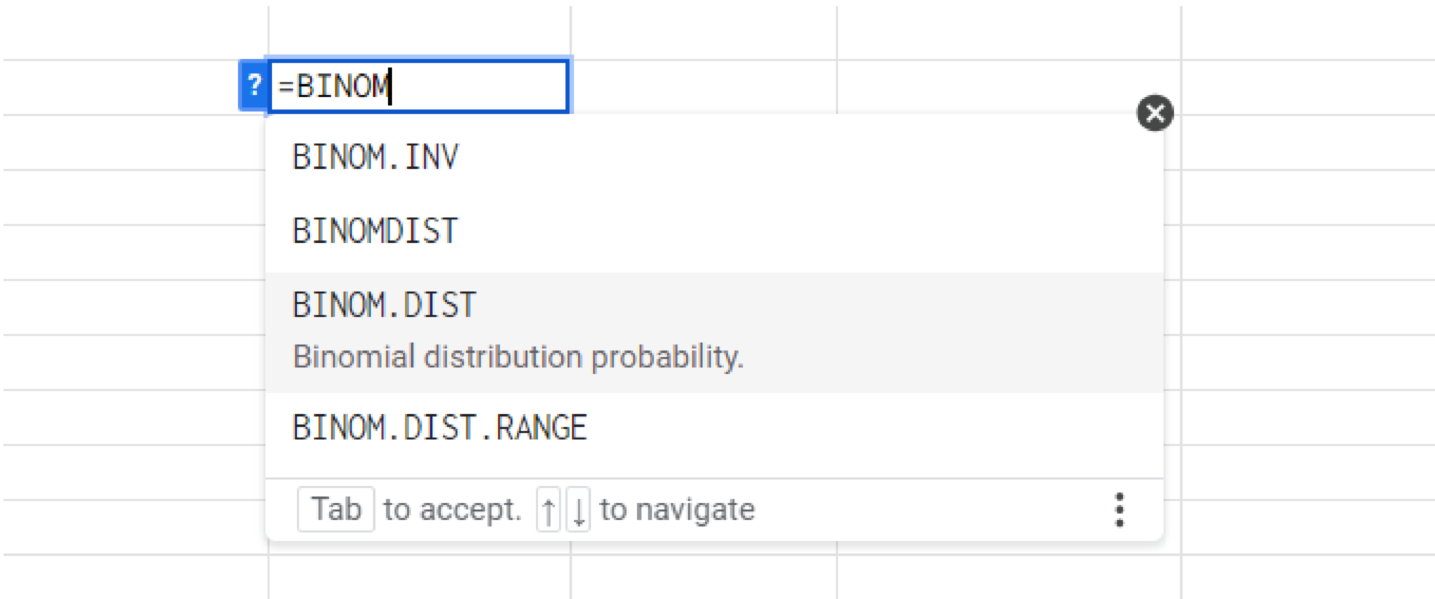
Binomial Distribution

For Practical questions related to Binomial Distribution follow the steps:

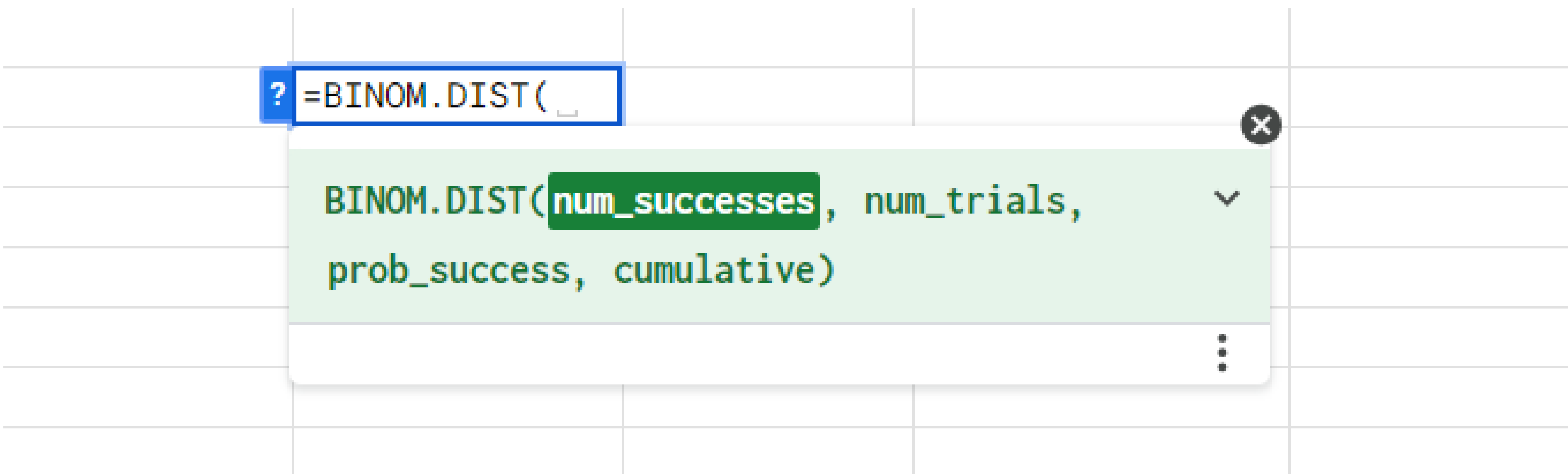
Step-1

Apply the formula --> BINOM.DIST()



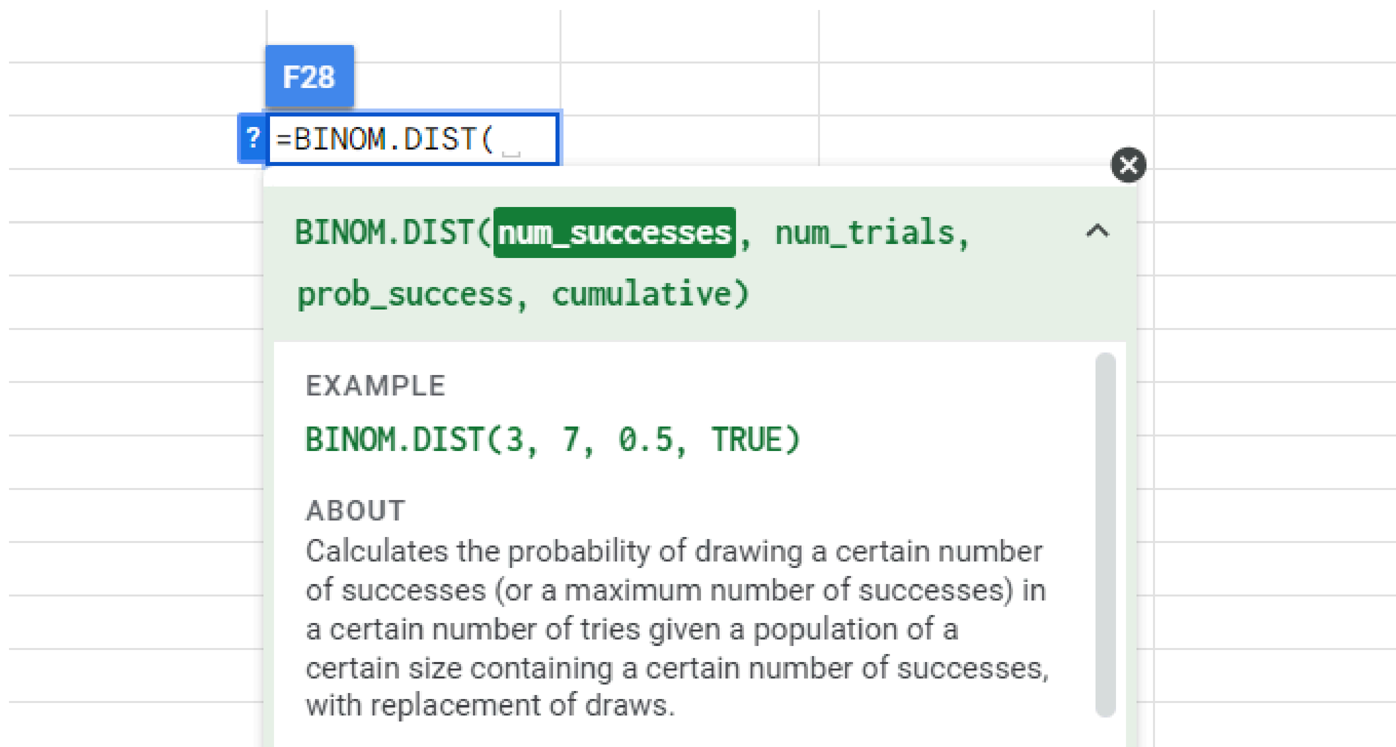
Step-2

Give the values for: num_successes , num_trials, prob_success and cumulative.



num_successes : Number of success i.e. x
num_trials : Number of Trials
prob_success : Probability of success

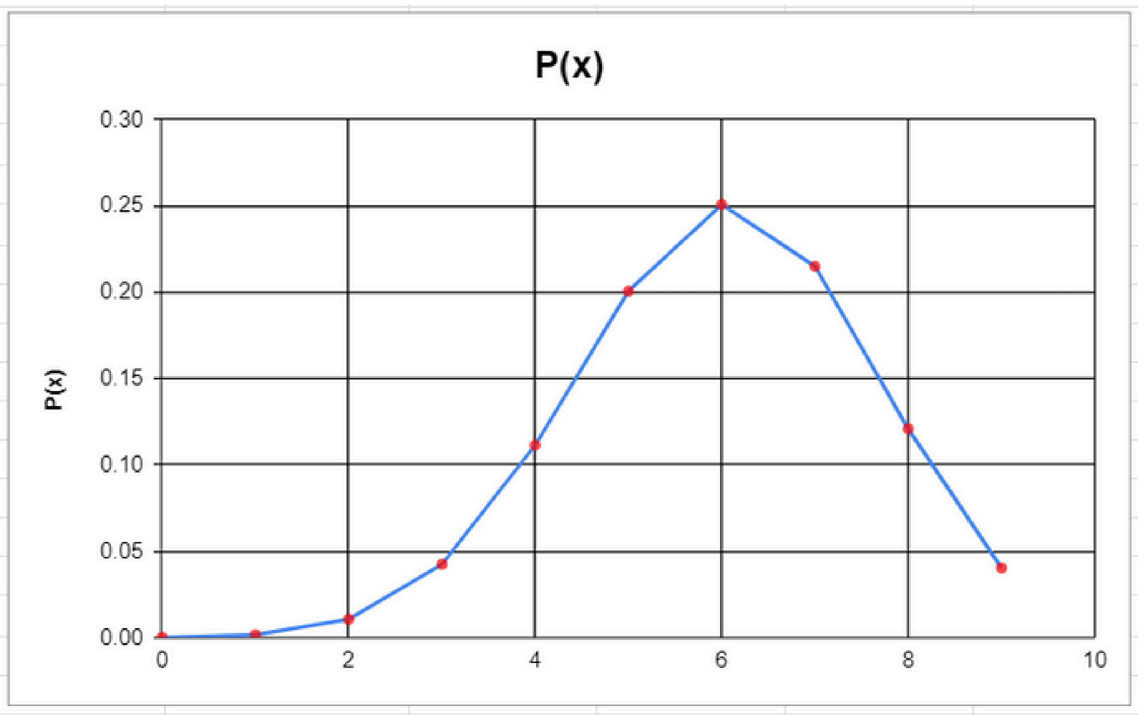
Note: Value of Cumulative will be true.



Example

Number of Trials	10
Probability For Sucess	0.6

x	P(x)
0	0.0001048576
1	0.001572864
2	0.010616832
3	0.042467328
4	0.111476736
5	0.2006581248
6	0.250822656
7	0.214990848
8	0.120932352
9	0.040310784



Here, x is the number of success.
P(x) is the Binomial Distribution probability

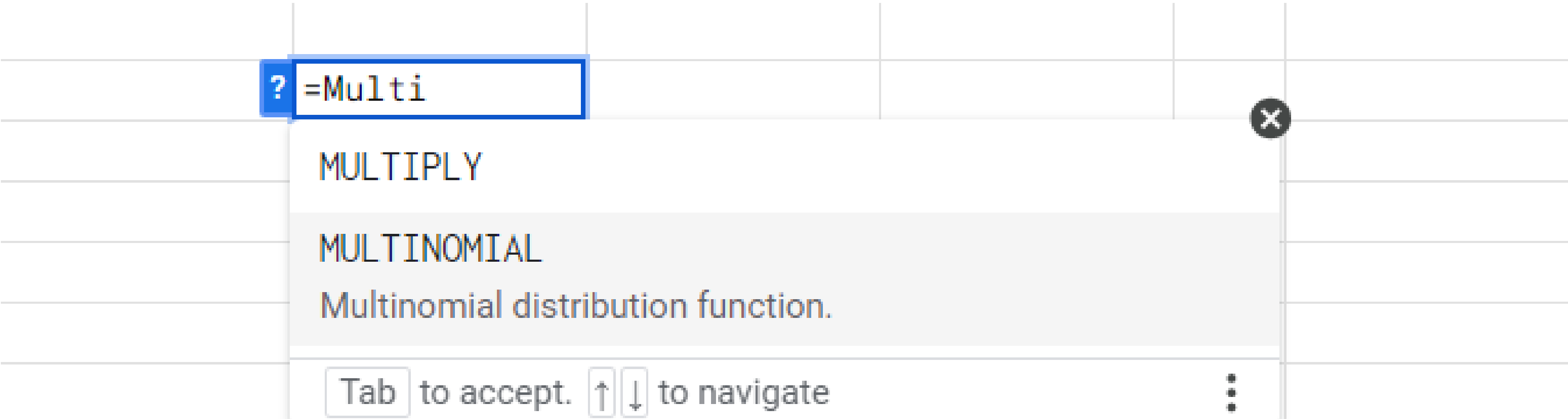
Multinomial Distribution

For Practical questions related to Multinomial Distribution follow the steps:

- The multinomial distribution describes the probabiity of obtaining a specific number of counts for k diferent outcomes when each outcome has a fixed probability of occuring.

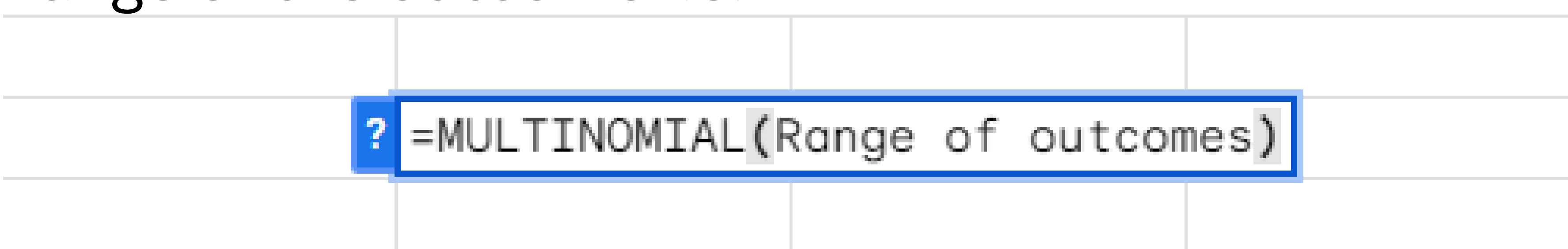
Step-1

Apply the formula --> MULTINOMIAL()



Step-2

Give the range of the outcome i.e. X



- If a Random variable x has a multinomial dstribution then the probability that the outcome 1 occurs exactly x1 times, outcome occurs exactly x2 times and so on ..., can be obtained by

For Example

X	
Outcome A	2
Outcome B	4
Outcome C	4

Range of Outcome(X)

Occurrence of outcome A

Occurrence of outcome C

Occurrence of outcome B

Probability of the outcomes

Probability	
Probability A	0.1
Probability B	0.4
Probability C	0.5

Product of Probability of the outcomes and occurrence of outcome, denote it by P

Probability A	^	Outcome A	0.01	= P1
Probability B	^	Outcome B	0.0256	= P2
Probability C	^	Outcome C	0.0625	= P3

Now, the probability of Multinomial is given by:

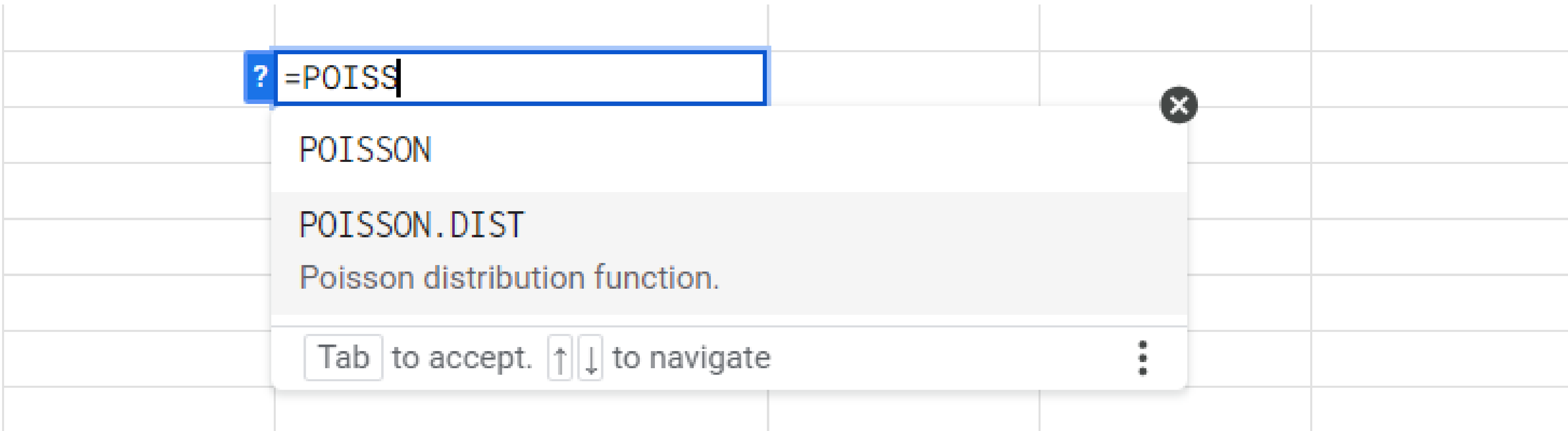
MULTINOMIAL*PRODUCT of (P1*P2*P3)

Poisson Distribution

For Practical questions related to Poisson Distribution follow the steps:

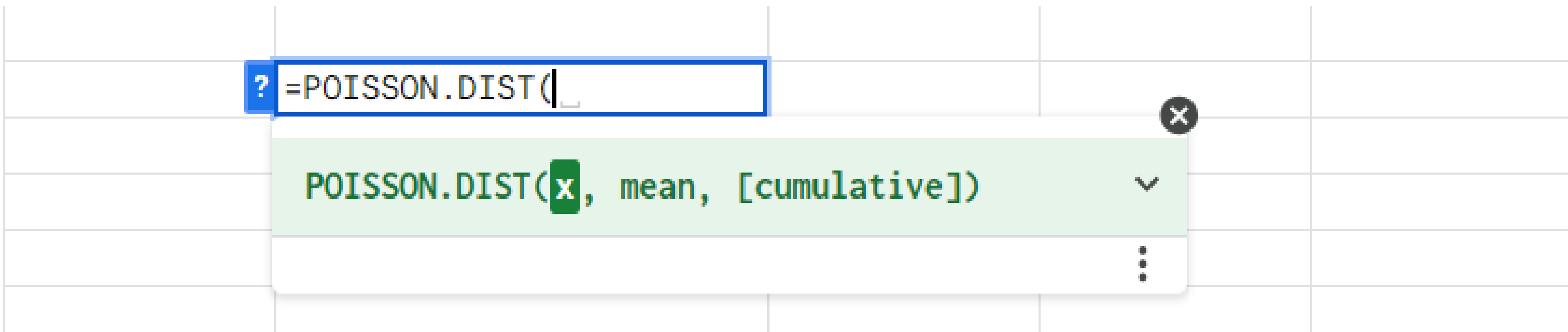
Step-1

Apply the formula --> POISSON.DIST()



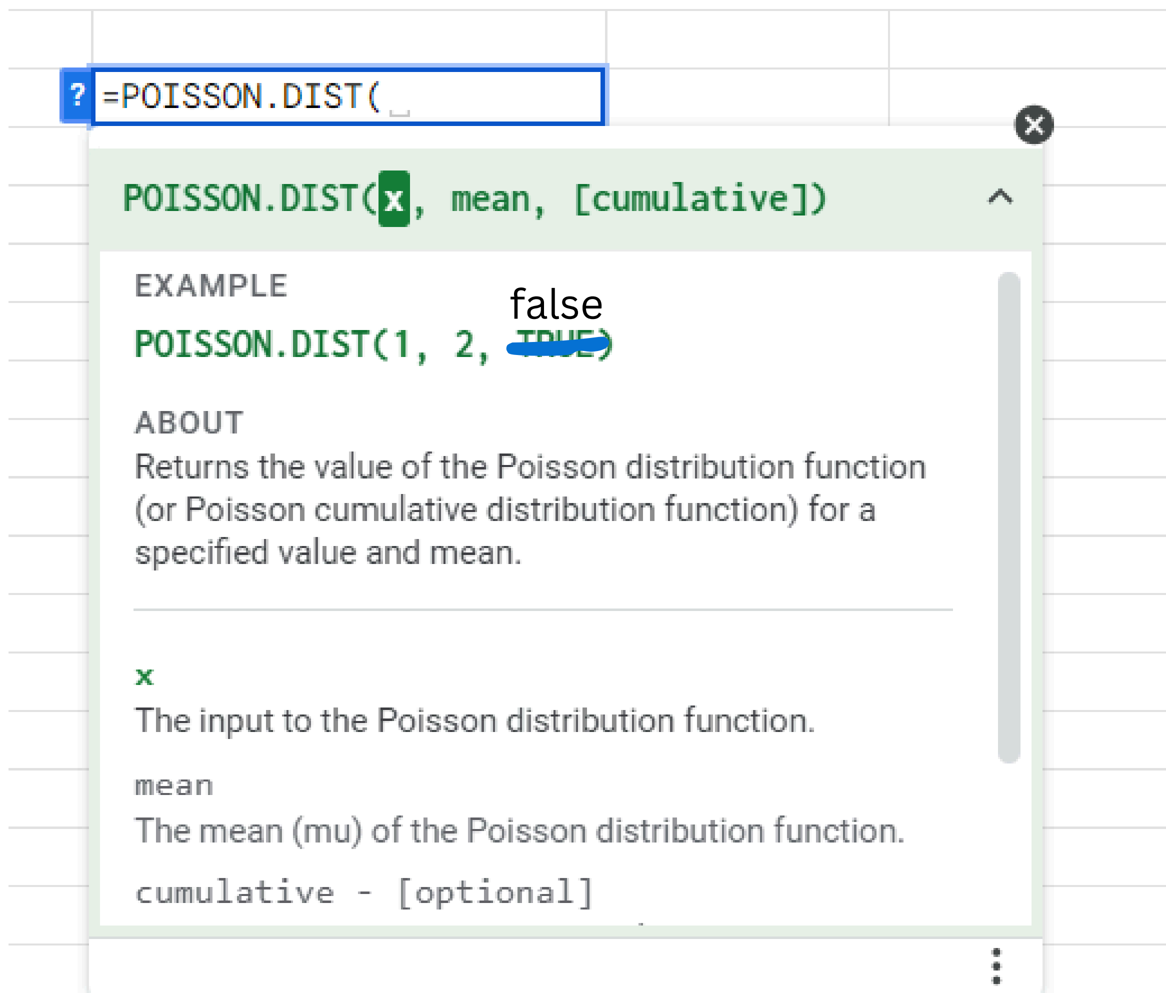
Step-2

Give the values for: x, mean and cumulative.



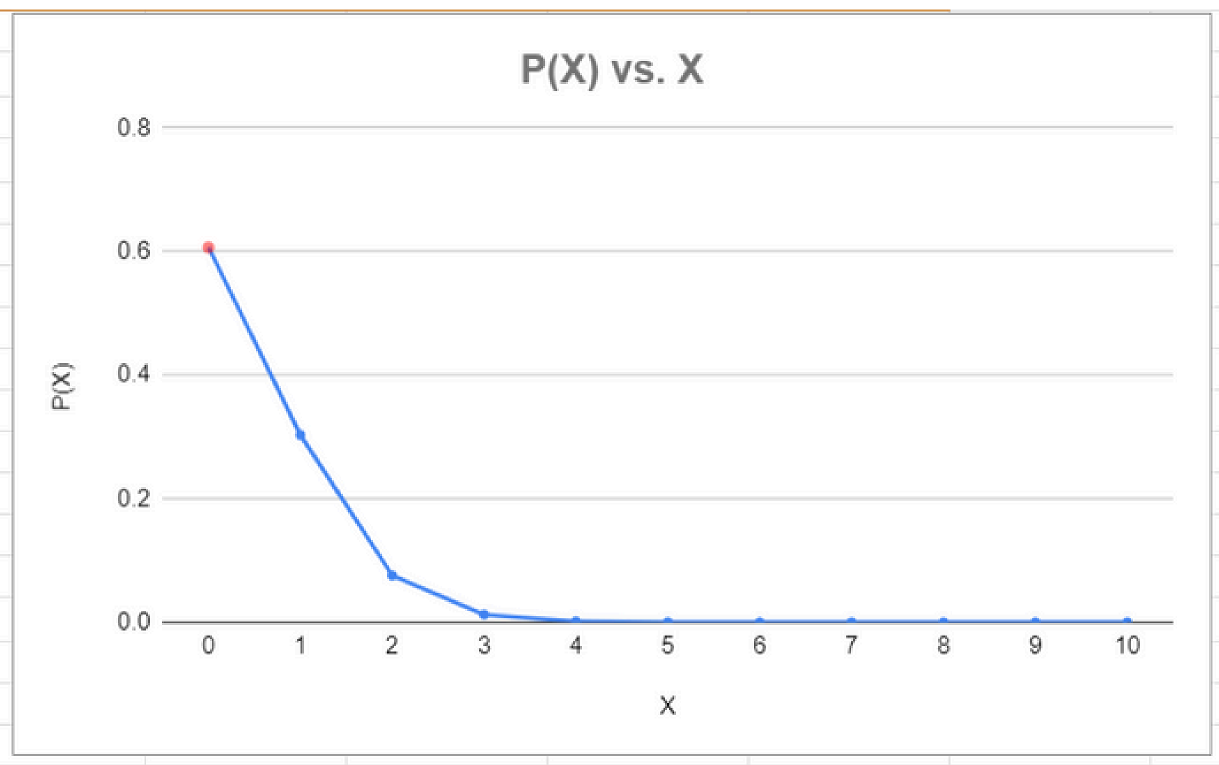
x : input to the Poisson distribution
mean : mean of Poisson distribution function.

Note: Value of Cumulative will be false.



Example

Lamda	0.5
X	**P(X)**
0	0.6065306597
1	0.3032653299
2	0.07581633246
3	0.01263605541
4	0.001579506926
5	0.0001579506926
6	0.00001316255772
7	0.0000009401826942
8	0.00000005876141839
9	0.000000003264523244
10	0.0000000001632261622



Here, x is the number of success.
P(x) is the Poisson Distribution probability

Geometric Distribution

For Practical questions related to Geometric Distribution follow the steps:

- In geometric distribution the probability of getting k failures before getting first success is P(X=k)= (1-p)^k*p

Step-1

Apply the formula : P(X=k)= [(1-p)^k]*p

F9	
Probability For Sucess	0.5

K	P(X)
1	={(1-F9)^D12}*F9

p i.e. F9 in the above case is the Probability of success.

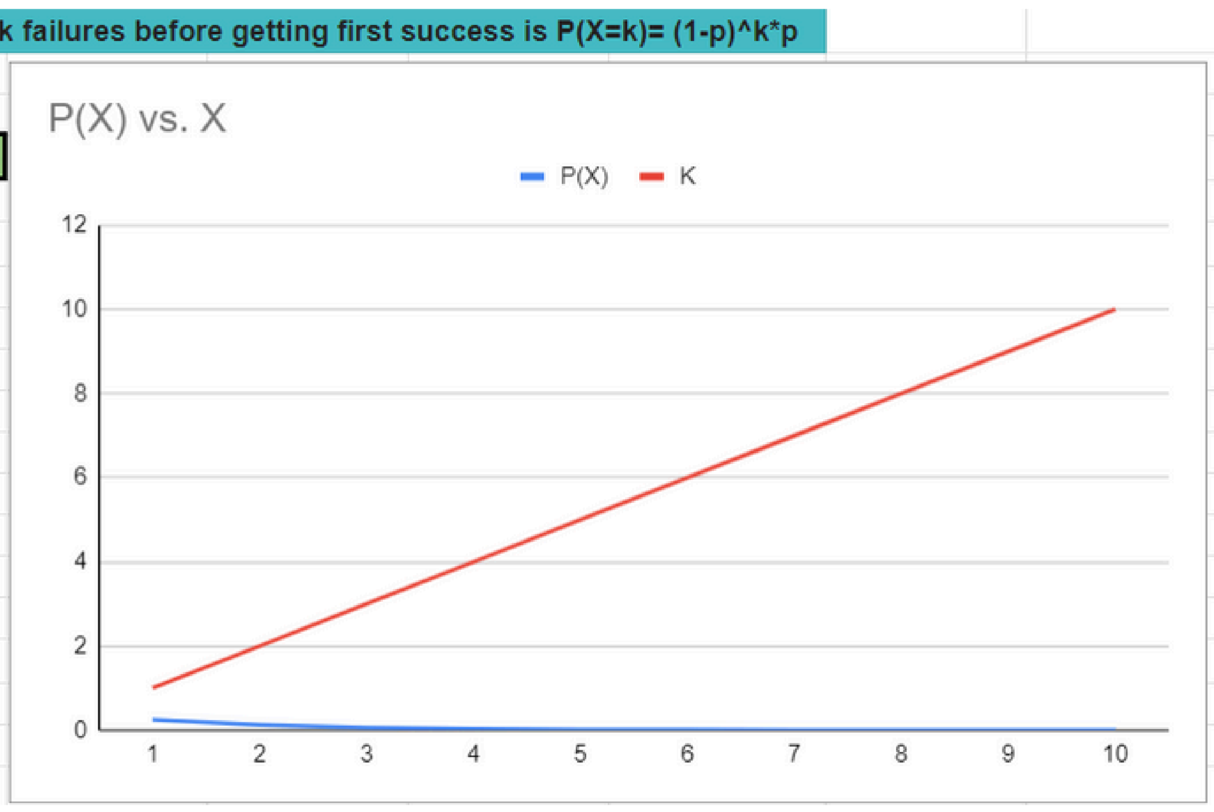
k i.e. D12 in the above case is the number of failure before first success

Example

In geometric distribution the probability of getting k failures before getting first success is P(X=k)= (1-p)^k*p

Probability For Sucess	0.5

K	P(X)
1	0.25
2	0.125
3	0.0625
4	0.03125
5	0.015625
6	0.0078125
7	0.00390625
8	0.001953125
9	0.0009765625
10	0.00048828125



Here, k is the number of failure.
P(x) is the Geometric Distribution probability

Uniform Distribution

For Practical questions related to Uniform Distribution follow the steps:

Step-1

Apply the formula : P=(X2-X1)/(b-a)

Example

Q.1)	A bus shows up at a bus stop every 20 min. If you arrive at the bus stop what is the probability that the bus will show up in 10 minutes or less.		
	P(the bus show up in =<10 mins)	-->	0.5
Q.2)	The weight of an article is uniformwly distributed between 15 and 25 gm. If you randomly select an article, what is the probability that the weight of the article lies between 17 and 19?		
	P(17 < weight of article < 19)	-->	0.2

- Value of a, b , X1 and X2 for above example

a	b	X1	X2
0	20	0	10
15	25	17	19

Conditional Data   X1 < X < X2

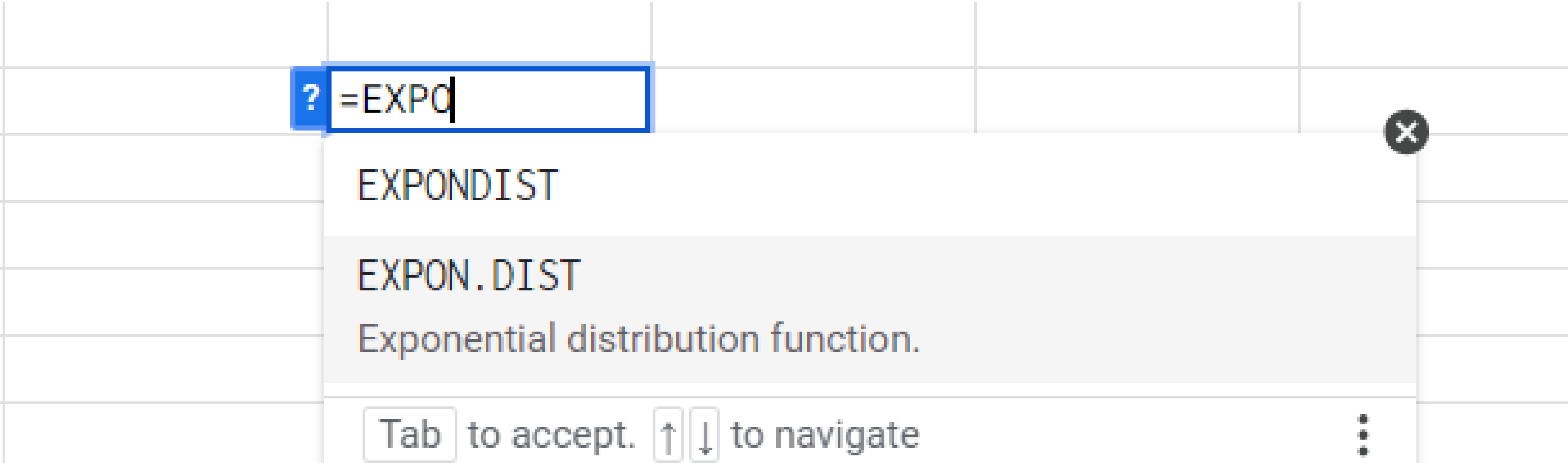
a : Minimum value of given conditional data
b : Maximum value of given conditional data
X1 : Minimum value of X.
X2 : Maximum value of X.

Exponential Distribution

For Practical questions related to Exponential Distribution follow the steps:

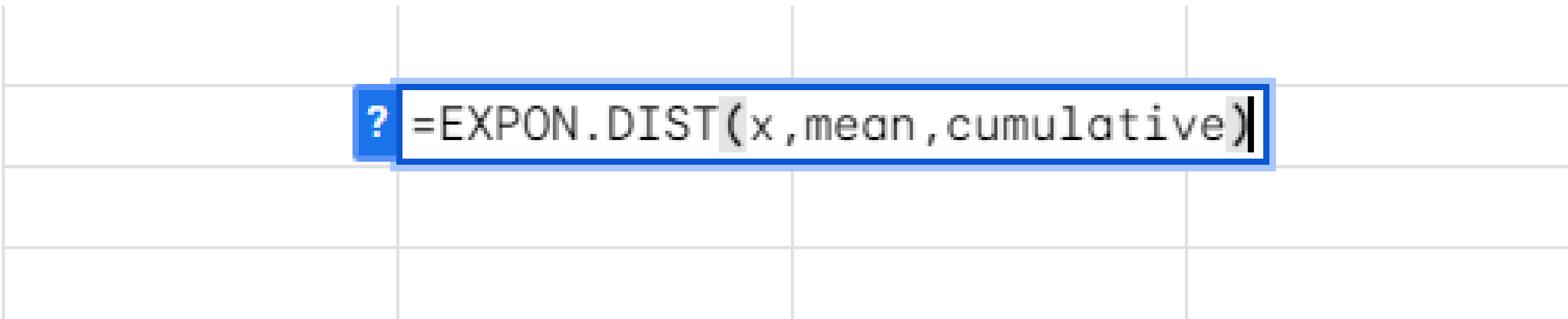
Step-1

Apply the formula --> EXPON.DIST()



Step-2

Give the values for: x, mean and cumulative.



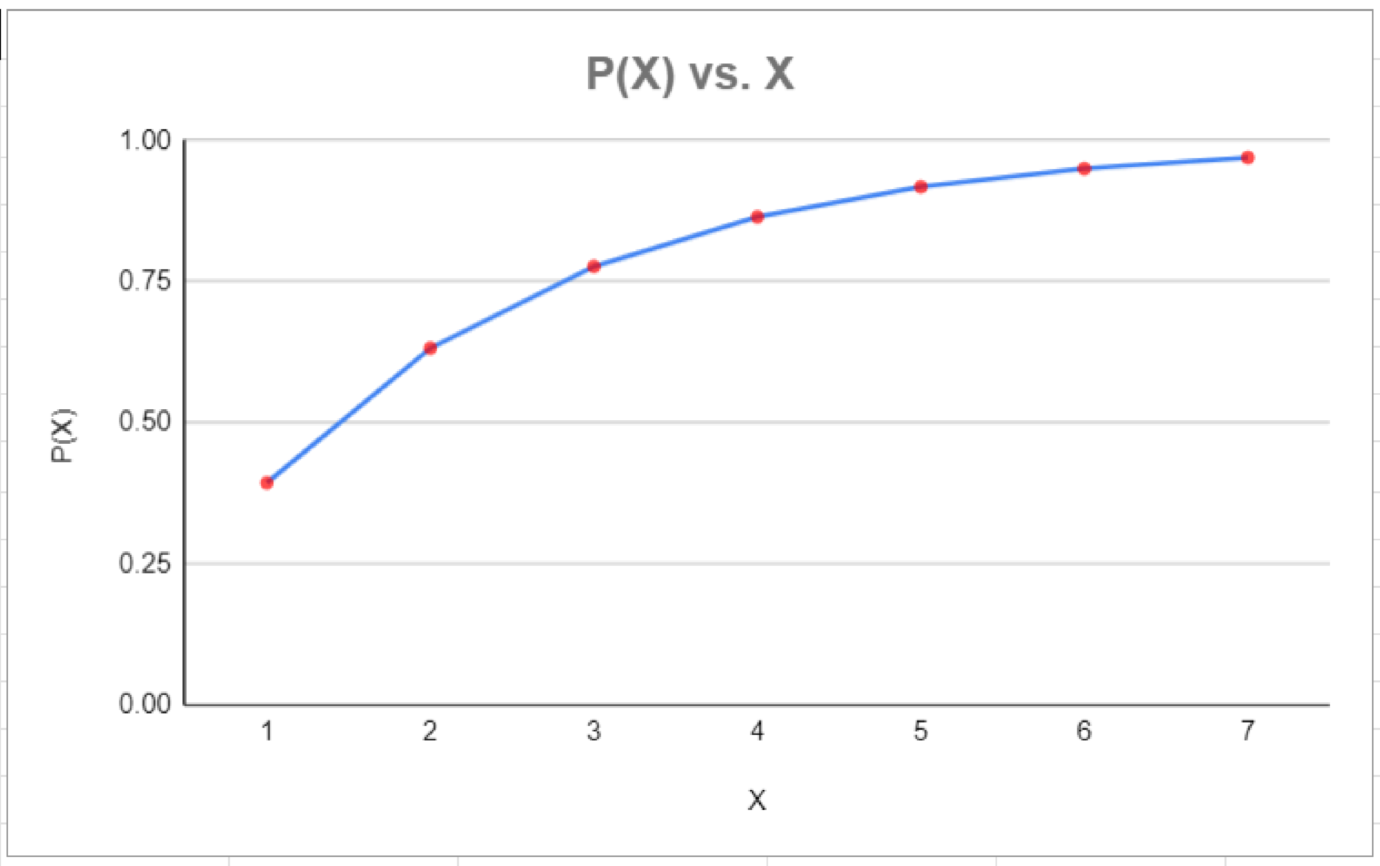
x : input to the exponential distribution
mean : mean of exponential distribution function.

Note: Value of Cumulative will be true.

Example

	Mean	0.5

X	P(X)
1	0.3934693403
2	0.6321205588
3	0.7768698399
4	0.8646647168
5	0.9179150014
6	0.9502129316
7	0.9698026166



Here,
P(x) is the Exponential Distribution probability

Q.1)	A new customer enters a shop every 2 minutes on average. After a customer arrives, find the probability that a new cutomer arrives in one minute.

a	b
2	0.5

P(X=1)	-->	0.3934693403

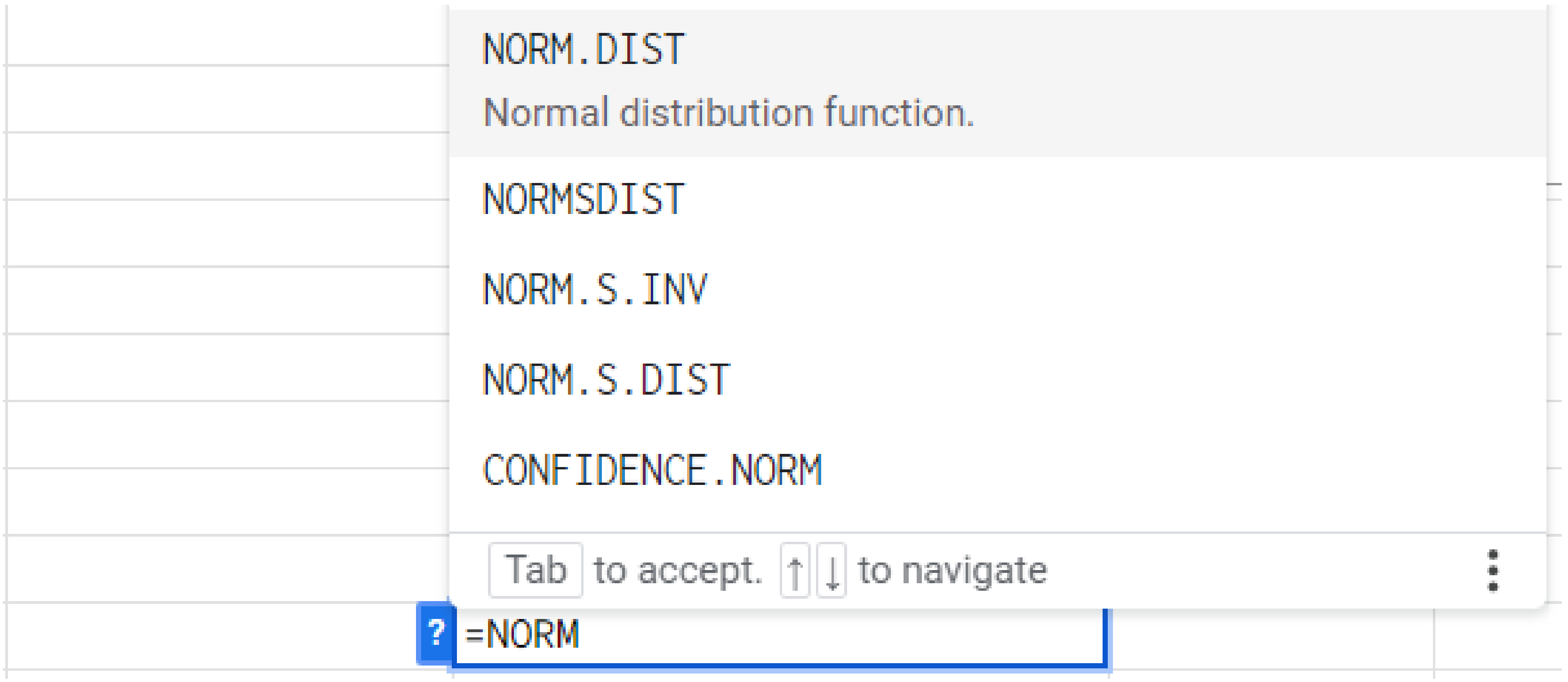
In the above problem X is 1, and the mean is being calculated from the given data i.e. new customers enters the shop every 2 min (i.e. a) on average(or mean i.e. b=0.5).

Normal Distribution

For Practical questions related to Normal Distribution follow the steps:

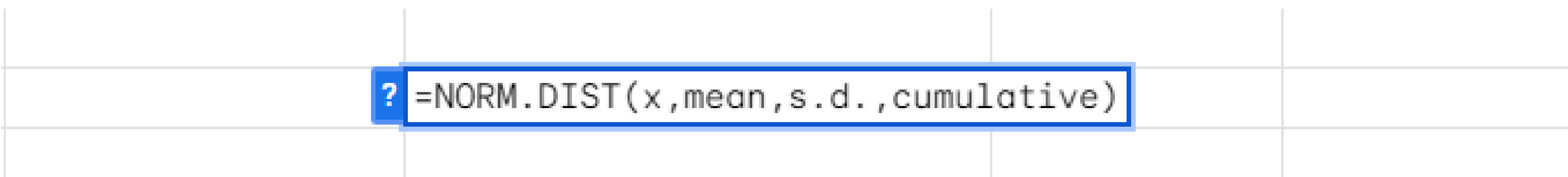
Step-1

Apply the formula NORM.DIST()



Step-2

Give the values for: x, mean, s.d. (standard deviation) and cumulative.



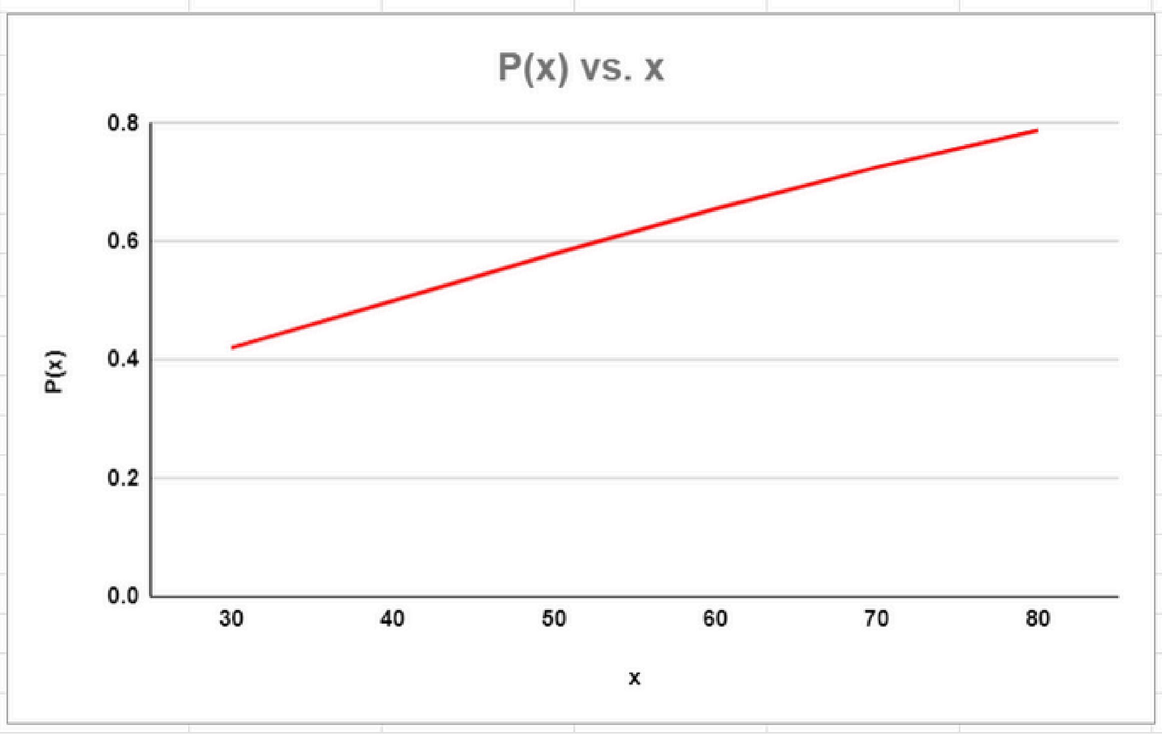
x : input to the Normal distribution
mean : mean of Normal distribution function.
s.d. : Standard Deviation

Note: Value of Cumulative will be true.

Example

Mean	40
Standard Deviation	50

x	P(x)
30	0.4207402906
40	0.5
50	0.5792597094
60	0.6554217416
70	0.7257468822
80	0.7881446014



Here,
P(x) is the Normal Distribution probability

Calculation of Covariance

For bivariate data

For Practical questions related to calculation of Covariance follow the steps:

To calculate the Covariance the formula is:

Average of ({X - Mean(X)} {Y - Mean(Y)})

Example

Q.1							
	X(Price)	Y(Supply)	Mean(X)	Mean(Y)	X - Mean(X)	Y - Mean(Y)	{X - Mean(X)} {Y - Mean(Y)}
	10	8	40	14	-30	-6	180
	20	6	40	14	-20	-8	160
	30	14	40	14	-10	0	0
	40	16	40	14	0	2	0
	50	10	40	14	10	-4	-40
	60	20	40	14	20	6	120
	70	24	40	14	30	10	300
Sum	280	98			0	0	720
		CoV(X,Y)	-->	102.8571429			

Average of all these values will give the covariance of X and Y for the given example

Step-1

Calculate the mean of X and Y

Step-2

- Calculate {X - mean(X)}
- Calculate {Y - mean(Y)}

Step-3

Calculate the product of {X - mean(X)}and{Y - mean(Y)}

Step-4

Now, Covariance of X and Y is :

CoV(X,Y) = Average of step3

Calculation of correlation coefficients for the bivariate frequency distribution

For Practical questions related to calculation of Karl Pearson's correlation coefficients follow the steps:

To calculate the Correlation Coefficient the formula is:

$$\boxed{\frac{(\{X - \text{Mean}(X)\}\ \{Y - \text{Mean}(Y)\})}{\sqrt{\sum(\{X - \text{Mean}(X)\}^2)}\sqrt{\sum(\{Y - \text{Mean}(Y)\}^2)}}}$$

Example

	X	Y	E(X)	E(Y)	X - E(X)	Y - E(Y)	(X - E(X))^2	(Y - E(Y))^2	(X - E(X))(Y - E(Y))
	12	6	24	15	-12	-9	144	81	108
	16	9	24	15	-8	-6	64	36	48
	20	12	24	15	-4	-3	16	9	12
	24	15	24	15	0	0	0	0	0
	28	18	24	15	4	3	16	9	12
	32	21	24	15	8	6	64	36	48
	36	24	24	15	12	9	144	81	108
Sum -->	168	105					448	252	336

r	-->	1

Step-1

Calculate the mean of X and Y

Step-2

- Calculate {X - mean(X)} = E(X)
- Calculate {Y - mean(Y)} = E(Y)

Step-3

- Calculate the square of {X - mean(X)}
- Calculate the square of {Y - mean(Y)}

Step-4

Calculate the product of {X - mean(X)}and{Y - mean(Y)}

Step-5

Now, Correlation Coefficient of X and Y is :

r(X,Y) = apply above mentioned formula

Calculation of Karl Pearson's correlation coefficients.

For Practical questions related to Random Number Generation follow the steps:

Step-1

- Go to File > Options > Add-ins > Excel Add-ins

Step-2

- Check the Analysis Toolpak box

Step-3

- Click Data Analysis option on the Data Menu

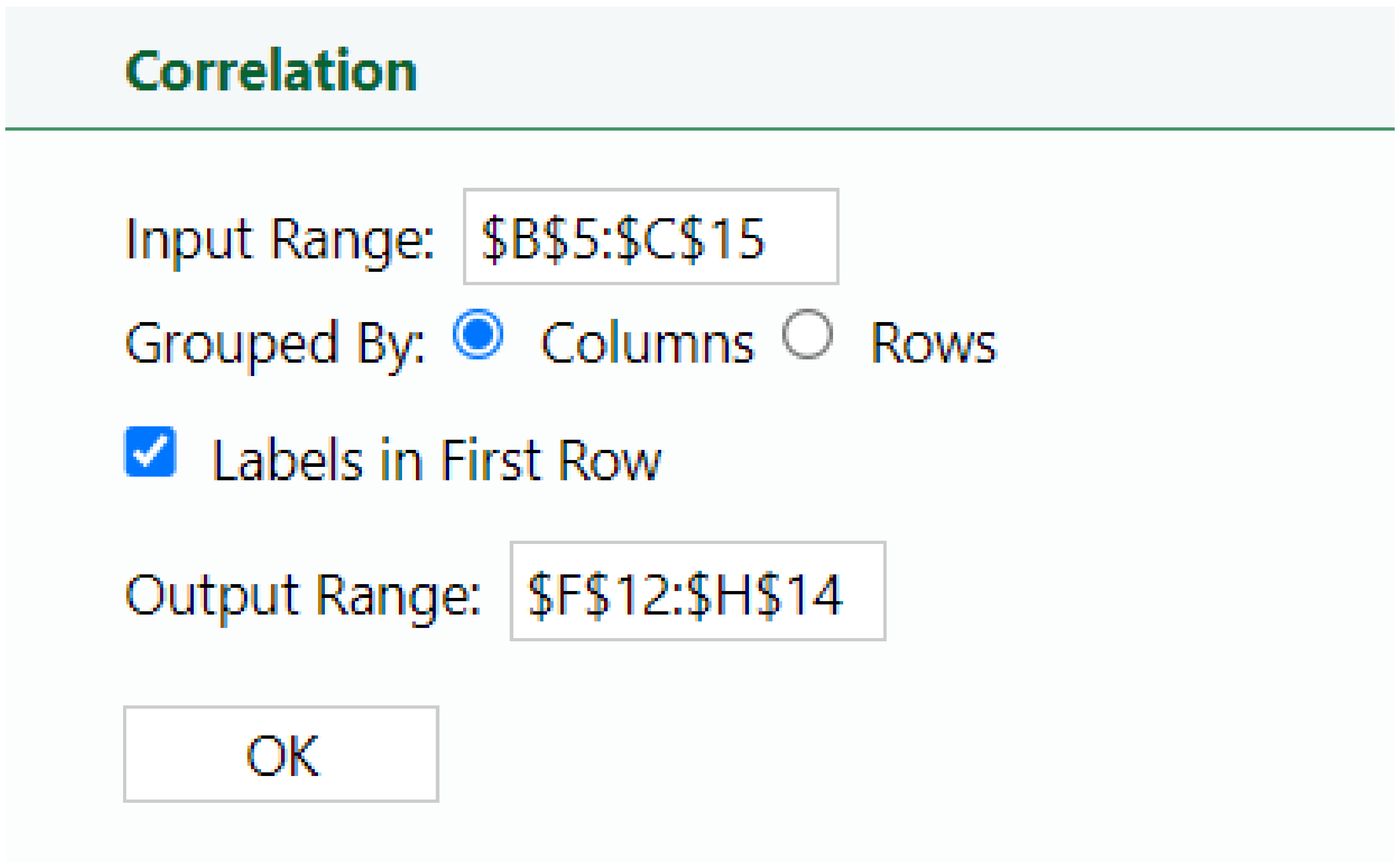
Step-4

- Select Correlation
- Click OK

X	Y
2	3
4	6
6	9
8	12
10	15
12	18
14	21
16	24
18	27
20	30

*Input Range

After we click OK, a Pop Up Box for correlation appears as shown below:



- In the Input range, enter the range of the X and Y.
- Select the Output range
- Click OK.

*Output of the Correlation Coefficient

	X	Y
X	1	
Y	1	1

Random Number Generation

For Practical questions related to Random Number Generation follow the steps:

Step-1

- Go to File > Options > Add-ins > Excel Add-ins

Step-2

- Check the Analysis Toolpak box

Step-3

- Click Data Analysis option on the Data Menu

Step-4

- Select Random Number Generation
- Click OK

Note that, for any type of Distribution the above steps would be common

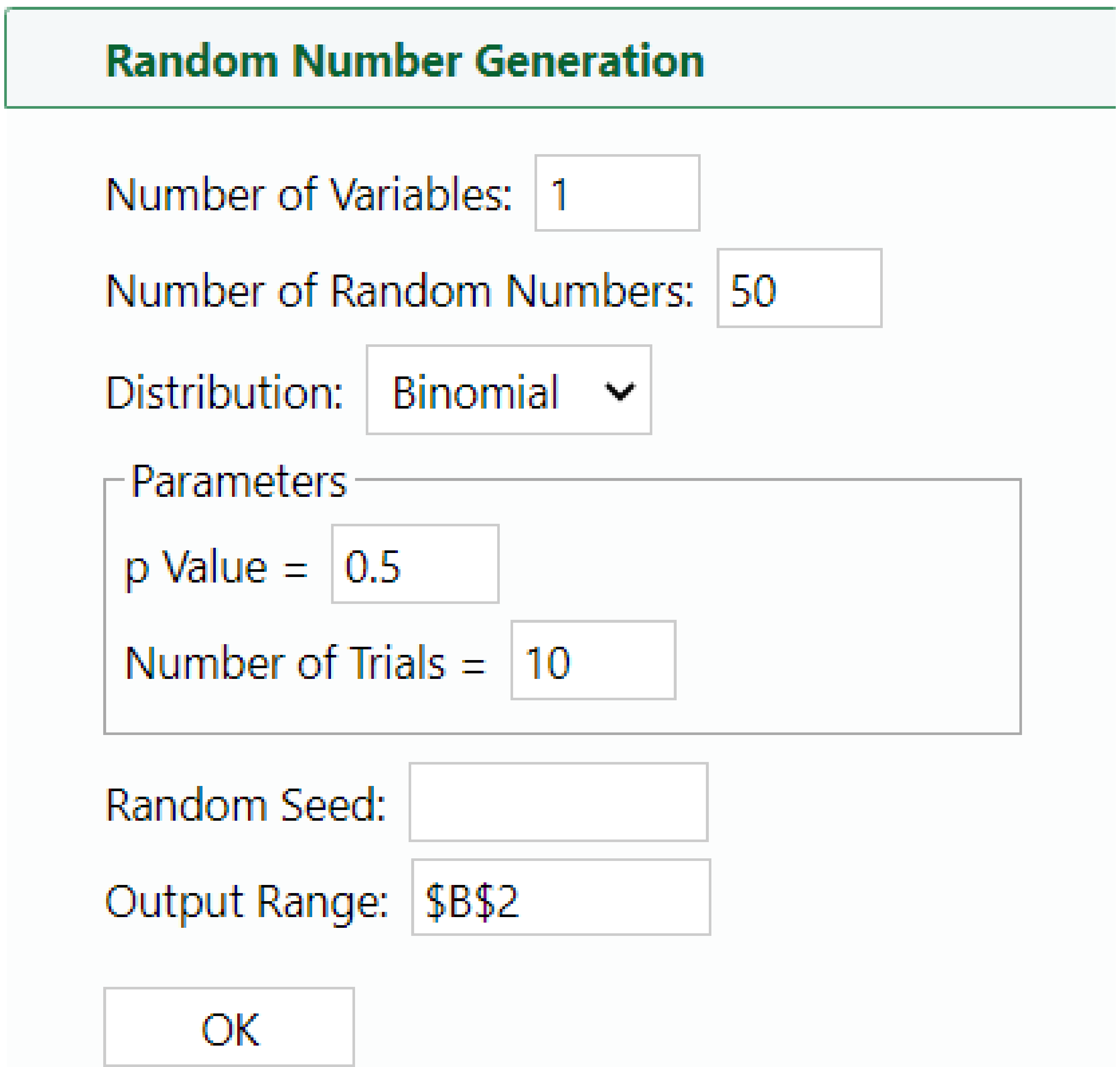
Add On Steps for different types of distribution:

Random Number Generation for Binomial Distribution

After Above 4 steps follow these steps

On Clicking Ok this Box will be displayed, Follow the below steps to generate random numbers for binomial Distribution:

- Set the Distribution to Binomial.
- Enter the number of Variables (in our case it will be 1)
- Enter the Number of random numbers to be generated (as per the question)
- Set the parameters for the binomial distribution as given in the question
- Set the output range
- Click OK.

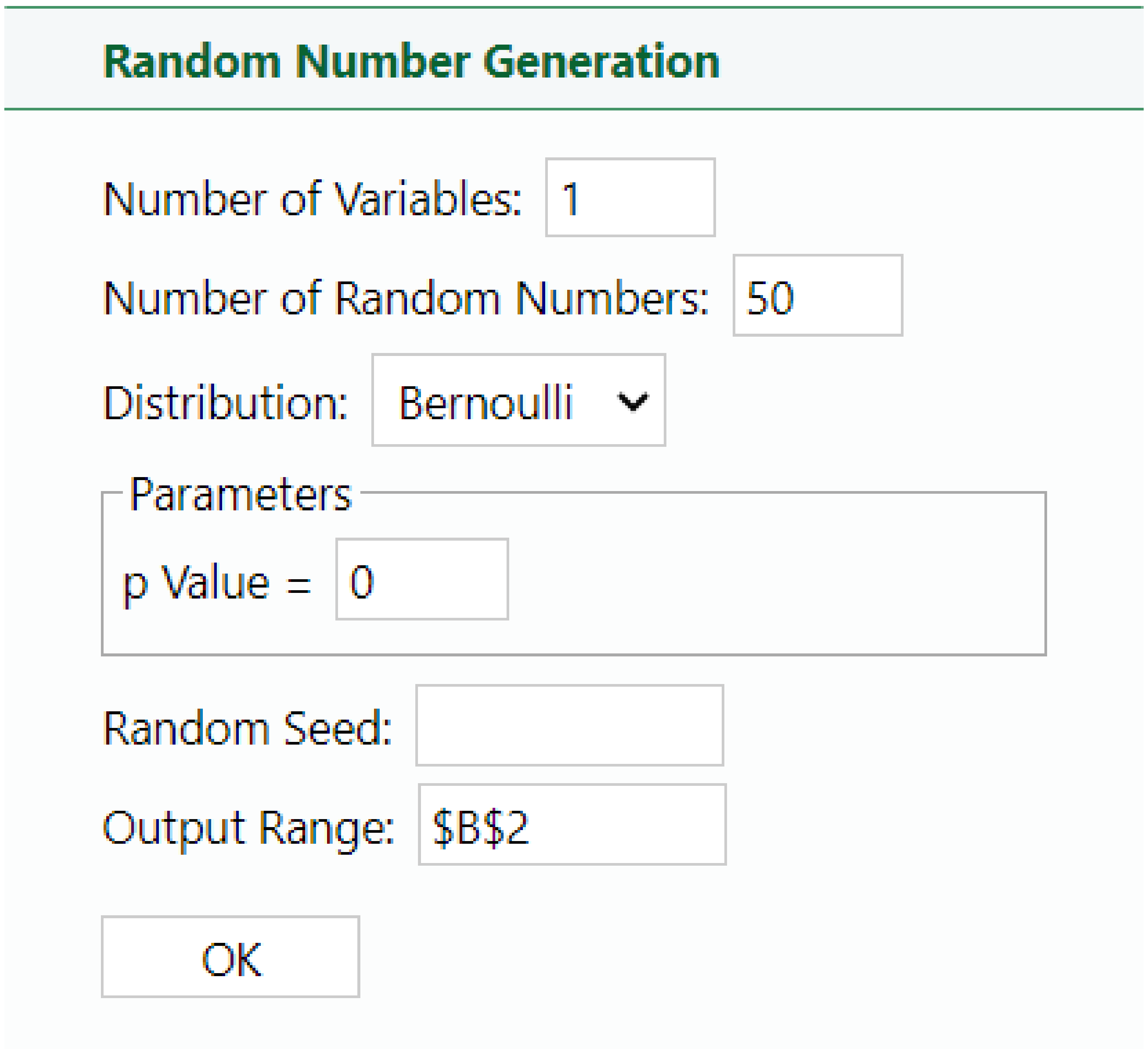


Random Number Generation for Bernoulli Distribution

After Above 4 steps follow these steps

On Clicking Ok this Box will be displayed, Follow the below steps to generate random numbers for Bernoulli Distribution:

- Set the Distribution to Bernoulli.
- Enter the number of Variables (in our case it will be 1)
- Enter the Number of random numbers to be generated (as per the question)
- Set the parameters for the bernoulli distribution as given in the question
- Set the output range
- Click OK.

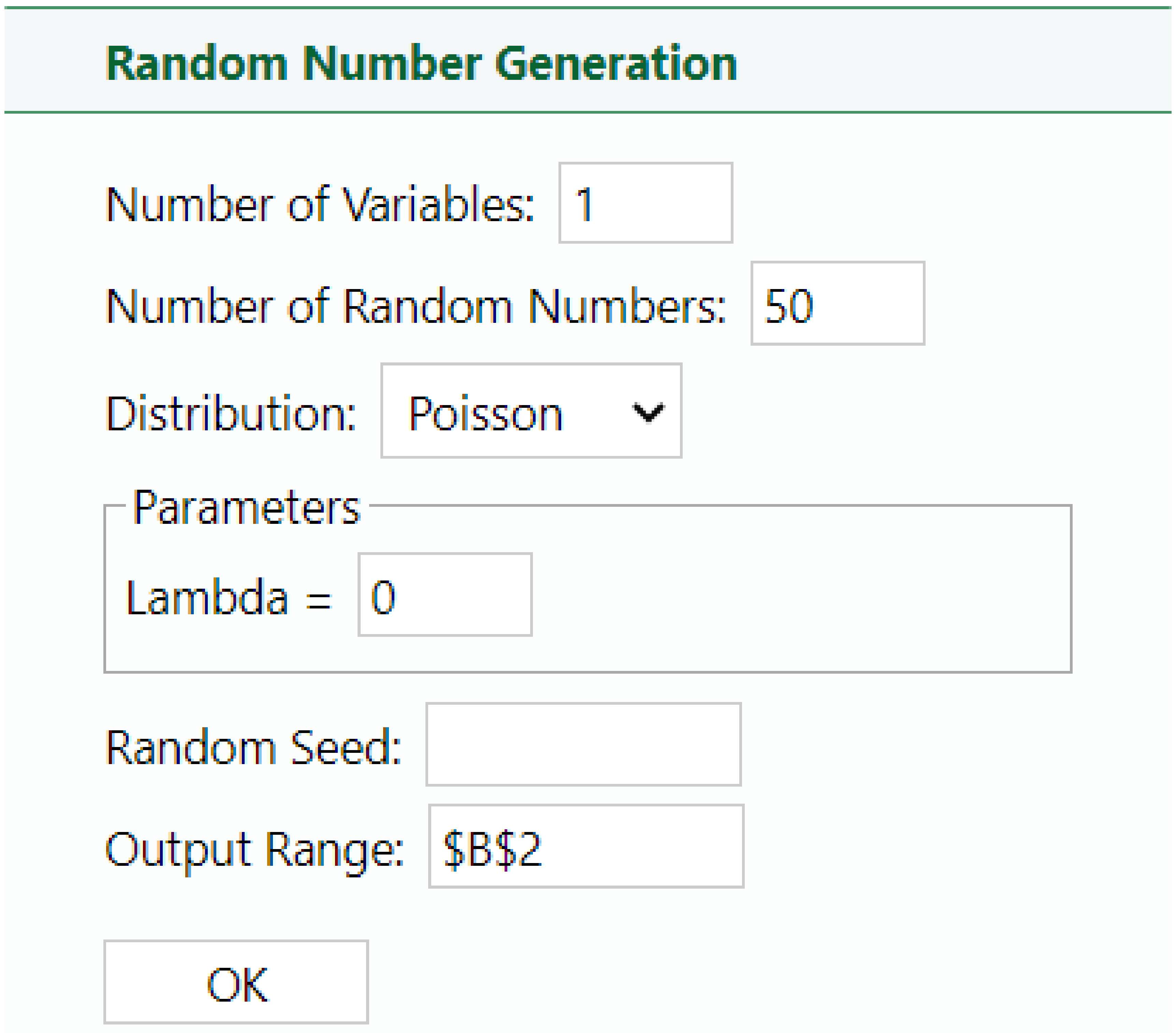


Random Number Generation for Poisson Distribution

After Above 4 steps follow these steps

On Clicking Ok this Box will be displayed, Follow the below steps to generate random numbers for Poisson Distribution:

- Set the Distribution to Poisson.
- Enter the number of Variables (in our case it will be 1)
- Enter the Number of random numbers to be generated (as per the question)
- Set the parameters for the poisson distribution as given in the question
- Set the output range
- Click OK.



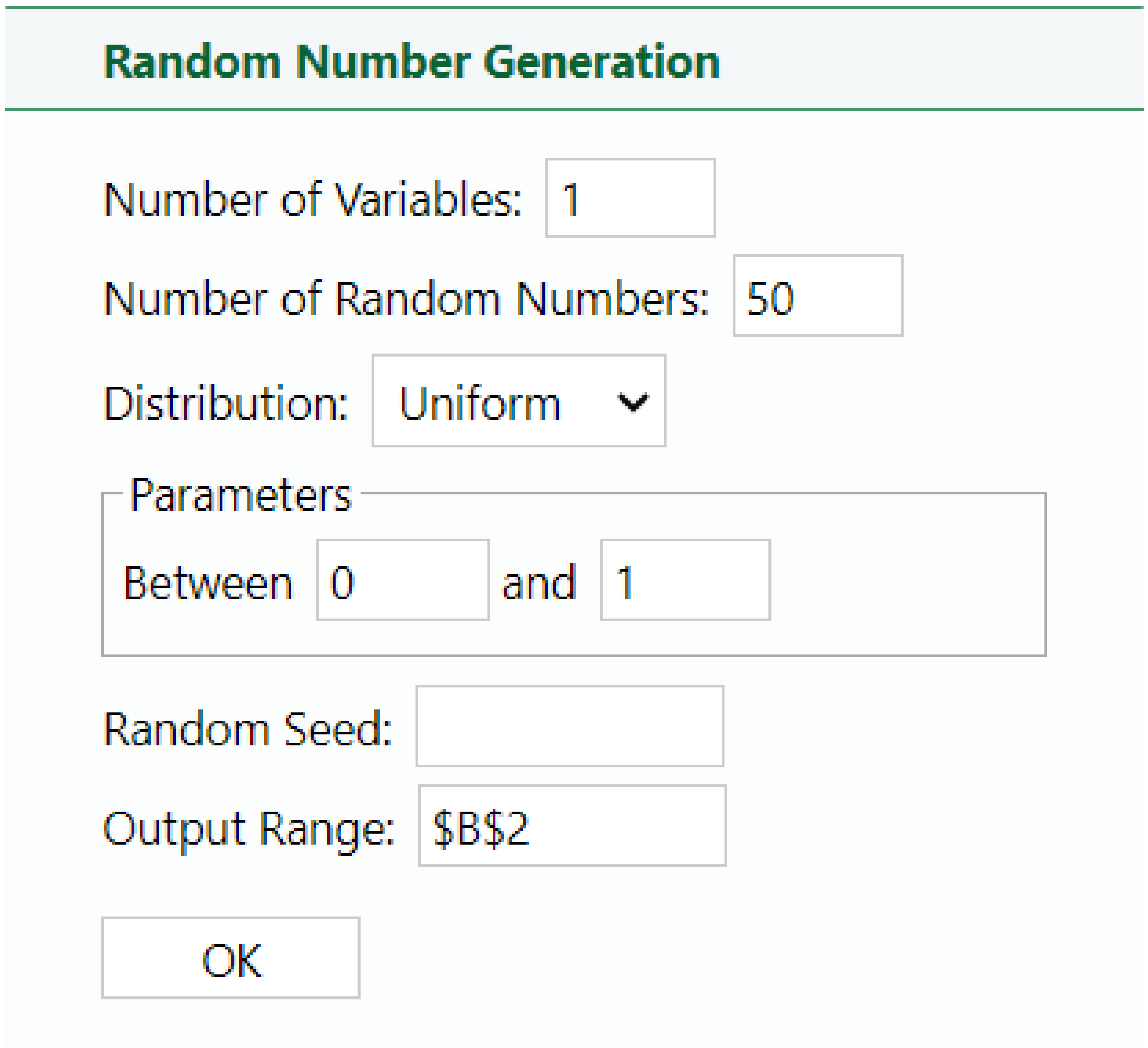
Note : Lambda is Mean.

Random Number Generation for Uniform Distribution

After Above 4 steps follow these steps

On Clicking Ok this Box will be displayed, Follow the below steps to generate random numbers for Uniform Distribution:

- Set the Distribution to Uniform.
- Enter the number of Variables (in our case it will be 1)
- Enter the Number of random numbers to be generated (as per the question)
- Set the parameters for the Uniform distribution as given in the question
- Set the output range
- Click OK.



Random Number Generation for Normal Distribution

After Above 4 steps follow these steps

On Clicking Ok this Box will be displayed, Follow the below steps to generate random numbers for Normal Distribution:

- Set the Distribution to Normal.
- Enter the number of Variables (in our case it will be 1)
- Enter the Number of random numbers to be generated (as per the question)
- Set the parameters for the normal distribution as given in the question
- Set the output range
- Click OK.