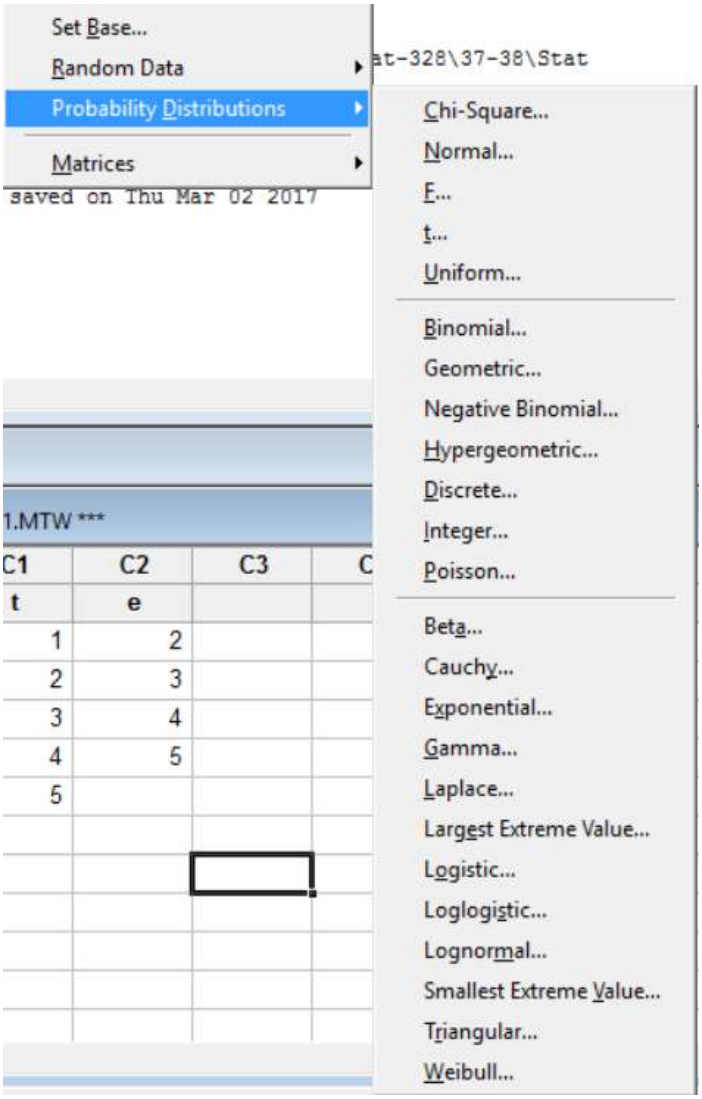
4-Probability Distributions

The calculations of the statistical distributions can be done in Minitab through selecting

Calc - -> probability distributions

We get the list of all possible discreet and continuous distributions in Minitab as



In each distribution, we can calculate the following:

- Probability

- cumulative probability

- Inverse cumulative probability

Example:

The Binomial Distribution

Let $X \sim Binomial(5, 0.3)$, then

(1) Calculate the probability $P(X = 3)$

(2) Calculate the table of the probabilities when $X = 0,1,2,3,4,5$

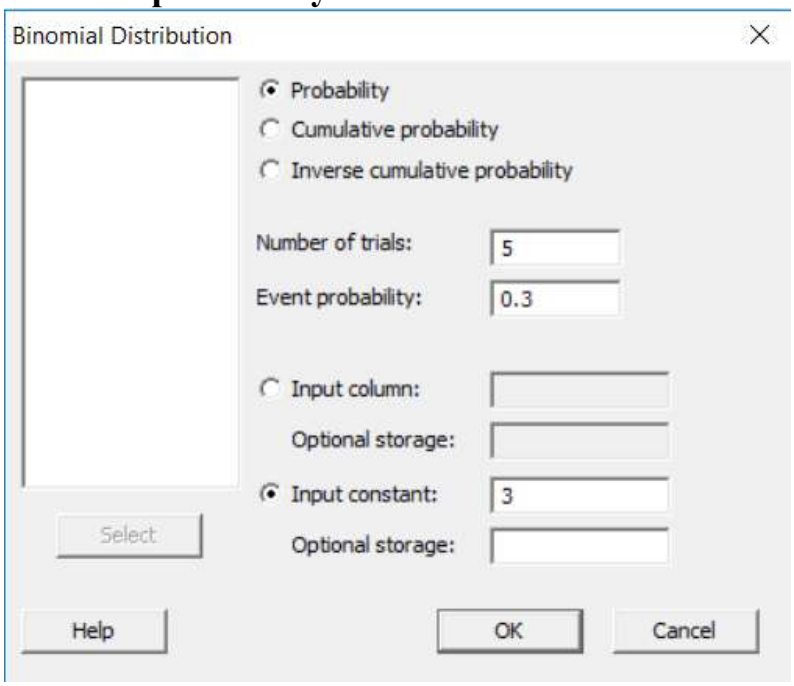
(3) Calculate $P(X \leq 3)$

(4) Calculate the constant k such that $P(X \leq k) = 0.75$

Solutions:

(1) select the

Calc - -> probability distributions - ->Binomial…



After entering the arguments as shown in the figure, we get:

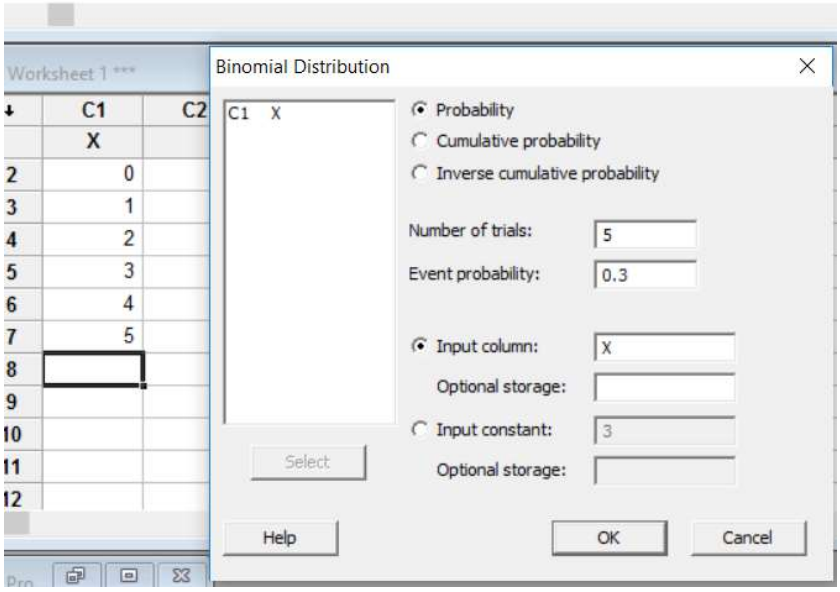
Probability Density Function

```
Binomial with n = 5 and p = 0.3

x   P( X = x )
3      0.1323
```

Then $P(X = 3) = 0.1323$

(2) to calculate the probabilities at many values of X at the time, we put the values of X in A certain column, say C1, we select the following



Click Enter, we get

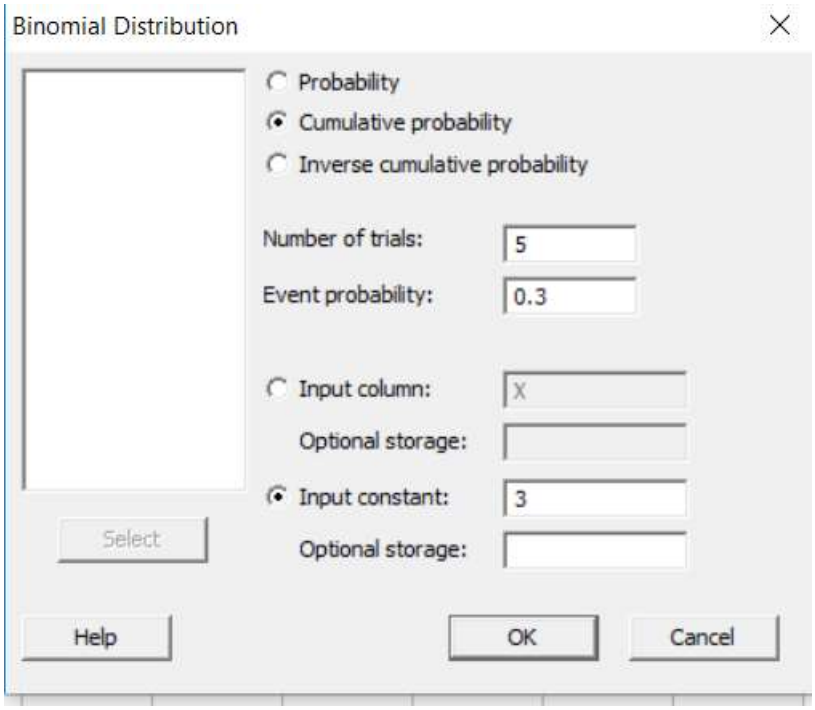
Probability Density Function

```
Binomial with n = 5 and p = 0.3

x   P( X = x )
*           *
0      0.16807
1      0.36015
2      0.30870
3      0.13230
4      0.02835
    5       0.00243
```

(3) Calculate $P(X \leq 3)$

Select the following



Click Enter, we get

Cumulative Distribution Function

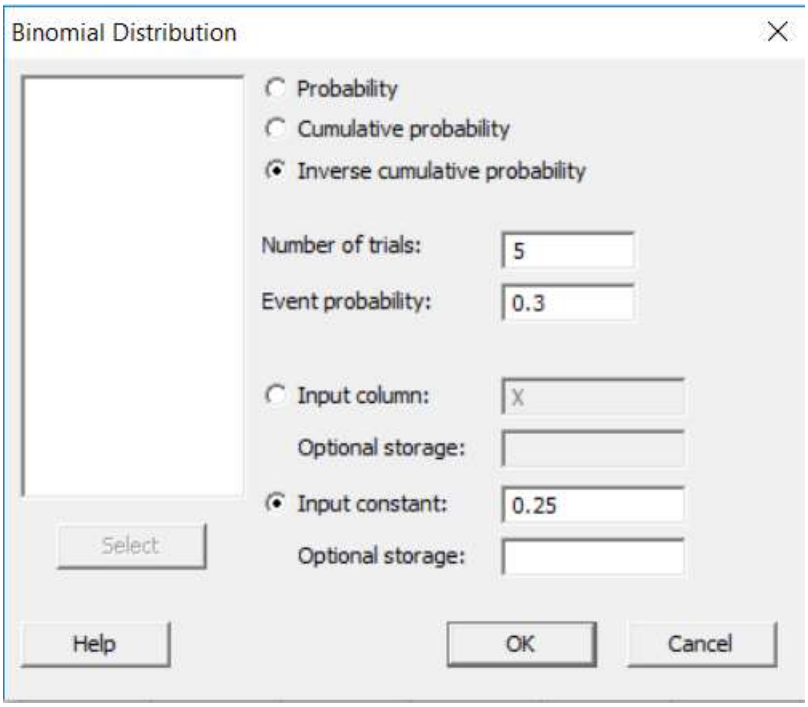
```
Binomial with n = 5 and p = 0.3

x  P( X <= x )
3      0.96922
```

Then $P(X \leq 3) = 0.96922$

(4) Calculate the constant k such that $P(X \leq k) = 0.75$

Select the following



Click Enter, we get

Inverse Cumulative Distribution Function

```
Binomial with n = 5 and p = 0.3

x   P( X <= x )       x   P( X <= x )
1       0.52822       2       0.83692
```

From these results, we see that $P(X \leq 1) = 0.52822$ and $P(X \leq 2) = 0.83692$

The nearest value to 0.75 is 0.83692, the we may approximate k to be 2.

5-Matrices

To copy columns into matrix use

Copy c1 c2 c3 … m1

To copy a matrix into columns use

Copy m1 c1 c2 c3 …

Example

```
MTB > copy c1 c2 m2
MTB > copy m2 c6 c7
```

Manipulate a matrix

Choose **Calc** > **Matrices** and choose one of the following commands:

Option	Description
Transpose	Transpose a matrix so that its rows become columns and its columns become rows.
Invert	Calculate the inverse of a square matrix.
Define Constant	Create a matrix with the same value in each cell.
Arithmetic	Perform arithmetic operations on matrices.

Some matrix commands in MINITAB Under the button Calc you find at the bottom Matrices. Use this if you want. Else you can enable commands and use the session window. You enable commands under Editor. Here are explanations of the commands.

Example

Read two matrices with the same dimensions

```
MTB > copy c1-c3 m1

MTB > copy c5-c7 m2

MTB > add m1 m2 m3

MTB > subt m1 m2 m4

MTB > inver m1 m10

MTB > tran m2 m7

MTB > mult m2 m1 m15
```