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

Set <u>R</u> an	<u>B</u> ase dom Data		, at	-328\37-38\Stat		
Prol	bability <u>Distr</u> trices on Thu Ma:	ibutions r 02 2017	•	Chi-Square Normal E t Uniform Binomial Geometric Negative Binomial Hypergeometric Discrete		
1.MTW *	**			 Integer		
C1	1 C2 C3		С	Poisson		
t	e			Beta		
1	2			Cauchy		
2	3			Exponential		
4	5			<u>G</u> amma		
5	-			Laplace		
				Largest Extreme Value		
	- T			L <u>o</u> gistic		
		(0)		Loglogi <u>s</u> tic		
				Lognor <u>m</u> al		
				Smallest Extreme Value		
				T <u>r</u> iangular		
			_	Weibull		

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 $P(X \le 3)$ (4) Calculate the constant k such that $P(X \le k) = 0.75$

Solutions:

(1) select the

Calc - -> probability distributions - ->Binomial...

Binomial Distribution			X
	Probability		
	C Cumulative probabi	lity	
	C Inverse cumulative	probability	
	Number of trials:	5	
	Event probability:	0.3	
	C Input column: Optional storage:		
Calast	Input constant:	3	
Delect	Optional storage:		
Help		OK Cancel	

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

Work	sheet 1 ***		Binomial Distributio	n	×
+ 2 3 4 5 6 7 7 8 8 9 10 11	C1 X 0 1 2 3 4 5	C2	C1 X Select	 Probability Cumulative probability Cumulative probabilic Inverse cumulative Number of trials: Event probability: Input column: Optional storage: C Input constant: Optional storage: 	ility probability 5 0.3 X 3 3
-			Help		OK Cancel

Click Enter, we get

Probability Density Function					
Bi	Binomial with $n = 5$ and $p = 0.3$				
х	P(X = X)				
*	*				
0	0.16807				
1	0.36015				
2	0.30870				
3	0.13230				
4	0.02835				
	5 0.00243				

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

Select the following

		×
C Probability		
Cumulative probability	lity	
C Inverse cumulative	probability	
Number of trials:	5	
Event probability:	0.3	
C Input column: Optional storage:	x	
Input constant:	3	
Optional storage:		
	OK Can	cel
	 Probability Cumulative probability Inverse cumulative Number of trials: Event probability: Input column: Optional storage: Input constant: Optional storage: 	 Probability Cumulative probability Inverse cumulative probability Number of trials: 5 Event probability: 0.3 Input column: X Optional storage: Optional storage: Optional storage: Optional storage:

Click Enter, we get

Cumulative Distribution Function		
Binomial with $n = 5$ and $p = 0.3$		
x P(X<=x) 3 0.96922		

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

(4) Calculate the constant k such that $P(X \le k) = 0.75$ Select the following

	C Probability	
	C Cumulative probabi	ility
	Inverse cumulative	probability
	Number of trials:	5
	Event probability:	0.3
	C Input column: Optional storage:	x
Tolast	Input constant: Ontional storage:	0.25

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 $P(X \le 1) = 0.52822$ and $P(X \le 2) = 0.83692$

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 > Matrice	s 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