TUTORIAL 1

Q1: A source produces the following text (* * * # * $ # $ $ # # * * * & # # # $ &), find the probability for each variable P(*), P(#), P($), P(&)

Solution:

$$p(*) = \frac{7}{20} = 0.35$$
$$p(\#) = \frac{7}{20} = 0.35$$
$$p(\$) = \frac{4}{20} = 0.2$$
$$p(\&) = \frac{2}{20} = 0.1$$

Q2: coin tossed two time, find the probability at these event:

1- at least get one header 2- at least two tail 3- at least one head and one tail

Solution:

S={HH, HT, TH, TT}

1- A={HH, HT, TH}
P(A)= ¾

2- B={TT}
P(B)= ¼

3- C={HT, TH}
P(C)= 2/4

Q3: Message of two variables if the probability of x, P(x)= 0.4. Find the probability of the second variable.

Solution:

P(x)+P(y)=1
0.4+P(y)=1
P(y)=1-0.4
P(y)=0.6

Q4: 5 variables of equal probability. Find the probability for every variable.

Solution:

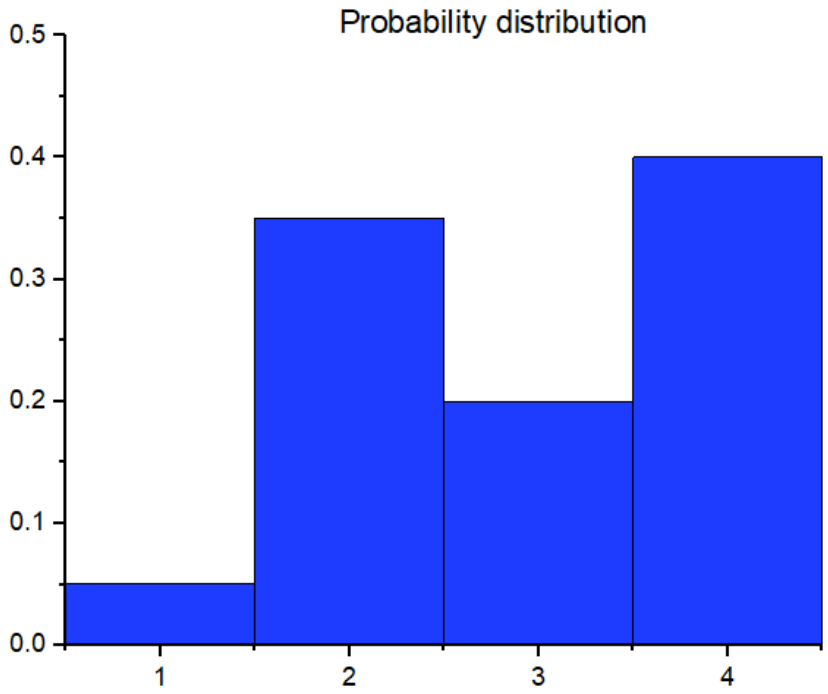
P(1)=P(2)=P(3)=P(4)=P(5)= $\frac{1}{n} = \frac{1}{5}$

Q5: Suppose a variable X can take the values 1, 2, 3, 4. The probabilities associated with each outcome are described by the following table:

Outcome:	1	2	3	4
Probability:	0.05	0.35	0.2	0.4

plot the probability distribution and the cumulative distribution.

Solution:



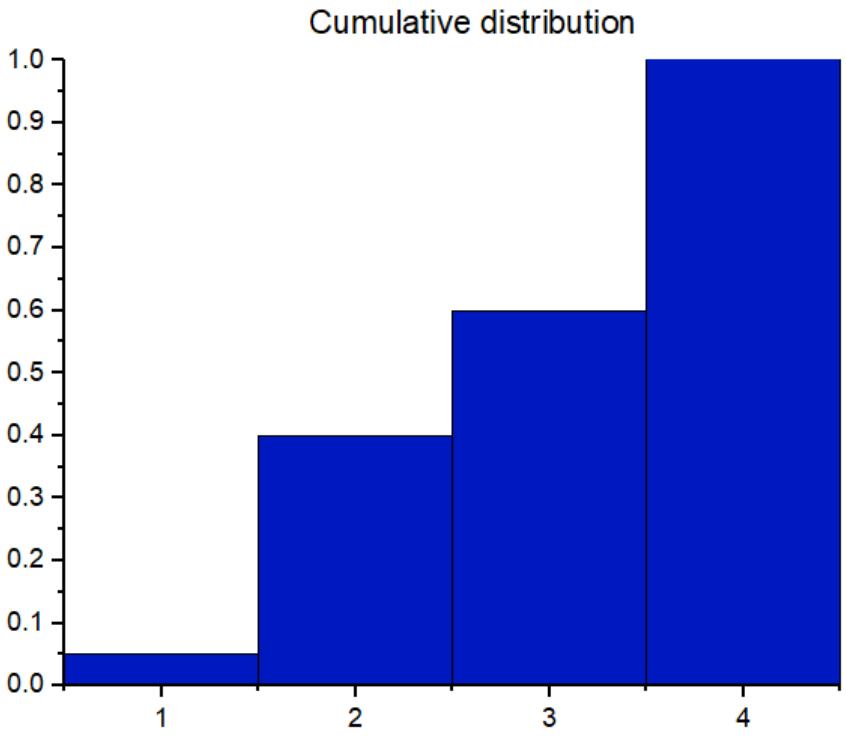
The cumulative distribution function for the above probability distribution is calculated as follows:

The probability that X is less than or equal to 1 is 0.05

the probability that X is less than or equal to 2 is 0.05+0.35 = 0.4,

the probability that X is less than or equal to 3 is 0.05+0.35+0.2 = 0.6,

and, the probability that X is less than or equal to 4 is 0.05+0.35+0.2+0.4 = 1.


Cumulative distribution
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1
2
3
4