**1.**

**The probability distribution**

The probability distribution for a random variable describes how the probabilities are distributed over the values of the random variable. In the development of the probability function for a discrete random variable, two conditions must be satisfied: (1) p(*x*) must be nonnegative for each value of the random variable, and (2) the sum of the probabilities for each value of the random variable must equal one.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *X* |  |  |  | * - - |  |
| *P*(X= *x*) |  |  |  | * - - |  |

**Mean = Expected value**

**Var(x)** =

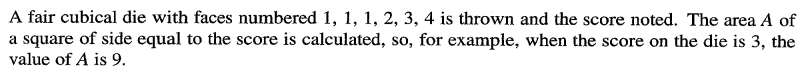
**Exercise:**

1. A fair 4 sided die, numbered 1, 2,3, and 5 is rolled twice. The random variable X is the sum of the two outcomes on which the die comes to rest.
2. Show that P(x = 8) =
3. Draw up the probability distribution table for X, and find p(*x* >6)



1. Text

   Description automatically generated



1. Text, letter

   Description automatically generated
2. Table

   Description automatically generated



Table

Description automatically generated

**Binomial /Bernoulli Distribution:**

A binomial distribution is one kind of discrete probability distribution that has **two possible outcomes**  (Success or failure / Pass or Fail)

**Properties/Criteria**

Binomial distributions must also meet the following three criteria:

* The number of observations or trials is fixed
* Trails are independent
* The probability of success or pass) is exactly the same from one trial to another.

When the random variable X, satisfies these conditions we denote it by

The random variable X, which represents the number of successes in the ***n*** trials of this experiment, has a probability distribution given by

( numbers of trails)

(probability of failure)

**Mean (Expected Value) and Variance of Binomial Distribution**

If , then mean Variance

**Exercise:**

1. A driving test is passed by 70% of people at their attempt. Find the probability that
2. exactly 5 people out of 10 people will passed the driving test.
3. More than 1 people out of 8 people will passed the driving test.

2.

Text

Description automatically generated

3.

Text, letter

Description automatically generated

**Poisson Distribution**

In probability theory and statistics, the Poisson distribution is a discrete probability distribution that expresses the probability of a given number of events occurring in a fixed interval of time or space if these events occur with a known constant mean rate and independently of the time since the last event.

**Conditions /Properties**

* Occurs singly
* The average rate at which events occur is always the same
* Events are independent

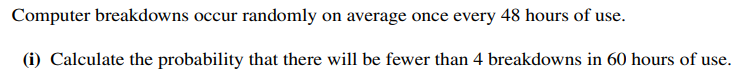
The random variable X, satisfying Poisson distribution , then probability distribution given by

**Mean (Expected Value) and Variance of Poisson Distribution**

Variance =

**Exercise:**

1.



(ii) there will be no breakdowns in 24 hours of use.

2.

Graphical user interface, text, application, email

Description automatically generated

3.

Text

Description automatically generated