**Poisson Distribution**

**The distribution of the number of events in a “random process”.**

**Examples:**

|  |  |
| --- | --- |
| **Random Process** | **Event** |
| **Telephone calls in a fixed time interval** | **Number of wrong calls in an hour****(Time dependent)** |
| **Accident in a factory** | **Number of Accident in a day****(Time dependent)** |
| **Flaws in a glass Panel** | **Number of flaws per square cm****(Area dependent)** |
| **Bacteria in Milk** | **Number of bacteria per 2 liter****(Volume dependent)** |

* **An event is as likely to occur in one given interval as it is in another.**
* **Events occur uniformly is proportional to the size of the time interval, area, or volume.**

**The Poisson distribution formula:**

**where**  and 

**The Poisson Notation:**

: The random variable x has a poisson distribution with parameter.

Where is a rate per unit and t is a time interval.

* X is the number of event in a time interval of length t with rate per unit time

**Expected Value and Variance of the Poisson Distribution**

 **and** 

Ex) Faults occur on a piece of string at an average rate of one every three meters. Bobbins, each containing 5 meters of this string, are to be used. What is the probability that a randomly selected bobbin will contain.

1. Two faults.
2. At least two faults.

Ex) A radioactive source emits particles at an average rate of one every 12 seconds. Find the probability that at most 5 particles are emitted in one minute.

Ex) A typist finds that they make two mistakes, on average, every three pages. Assuming that the number of errors per page follows a poisson distribution, what are the chances that there will be 2 mistakes in the nexst page they type?