**Poisson Distribution:**

1. A manufacturer of cotter pins knows that 5% of his product is defective. If he sells cotter pins in boxes of 100 and guarantees that not more than 10 pins will be defective, what is the approximate probability that a box will fail to meet the guaranteed quality?

2. A car hire firm has two cars, which it hires out day by day. The number of demands for a car on each day is distributed as a Poisson distribution with mean 1.5. Calculate the proportion of days on which

1. neither car is used,
2. the proportion of days on which some demand is refused.

3. An insurance company insures 4,000 people against loss of both eyes in a car accident. Based on previous data, the rates were computed on the assumption that on the average 10 persons in 1,00,000 will have car accident each year that result in this type of injury. What is the probability that more than 3 of the insured will collect on their policy in a given year?

4. A manufacturer, who produces medicine bottles, finds that 0.1% of the bottles are defective. The bottles are packed in boxes containing 500 bottles. A drug manufacturer buys 100 boxes from the producer of bottles. Using Poisson distribution, find how many boxes will contain :

i) no defective, ii) at least two defectives. []

5. Six coins are tossed 6,400 times. Using the Poisson distribution, find the approximate probability of getting six heads ***r*** times.

6. In a book of 520 pages, 390 typo-graphical errors occur. Assuming Poisson law for the number of errors per page, find the probability that a random sample of 5 pages will contain no error.

7. In a Poisson frequency distribution, frequency corresponding to 3 successes is 2/3 times frequency corresponding to 4 successes. Find the *mean & standard deviation* of the distribution.

8. The average number of customer arrivals per minute at a super bazaar is 2. Find the probability that during one particular minute (i) exactly 3 customers will arrive, (ii) at the most two customers will arrive, (iii) at least one customer will arrive.

9. If X is a Poisson variate such that 

Find i)****** ii) mean & variance.

10. If X & Y are independent Poisson variate such that

 Find the variance of

i) *X-2Y.* ii) 2*X-3Y*

11. Find out the fallacy if any in the following statement “ The mean of a Poisson Distribution is 2 & the variance is 3”.

12. If the random variable X follows Poisson distribution such that , find the mean & variance of the distribution. Also find .

13. A hospital switch board receives an average of 4 emergency calls in a 10 minutes interval. What is the probability that

1. there are at least 2 emergency calls
2. there are exactly 3 emergency calls in an interval of 10 minutes?

14. If the mean of the Poisson distribution is 4, find.

15. If the variance of Poisson distribution is 2, find the probabilities of *r* = 1,2,3,4.

16. A variable X follows a Poisson distribution with variance 3. Calculate 

17. If *X & Y* are independent Poisson variates with mean & , find the probability that *X + Y = k*.

18. If *X , Y* are independent Poisson variates with mean 2 & 3, find the variance of 3 *X -2 Y*.

19. If  are three independent Poisson variates with parameters  respectively, find 

20. A transmission channel has a per-digit error probability *p* = 0.01. Calculate the probability of more than 1 error in 10 received digits using i) Binomial Distribution ii) Poisson distribution.

21. Find the probability that at most 4 defective bulbs will be found in a box of 200 bulbs if it is know that 2 percent of the bulbs are defective. (e-4 = 0.0183)

22. In a certain factory turning out blades, there is a small chance 1/500 for any blade to be defective. The blades are supplied in packets of 10.Use the Poisson distribution to calculate the approximate number of packets containing no defective, one defective, two defective blades in a consignment of 10,000 packets. (e-0.02 = 0.9802)

23. The number of accidents in a year attributed to taxi drivers in a city follows Poisson distribution with mean 3. Out of 1,000 taxi drivers; find approximately, the number of drivers with i) no accident in a year, ii) more than 3 accidents in a year.

(e-1 = 0.3679 , e-2 = 0.1353 , e-3 = 0.0498)

24. It is known that the probability of an item produced by a certain machine will be defective is 0.05. If the produced items are send to the market in packets of 20, find the number of packets containing i) at least ii) exactly & iii) at most 2 defective items in a consignment of 1000 packets using a) Binomial Distribution b) Poisson distribution.

25. A manufacturer of pins knows that on an average 5% of his product is defective. He sells pins in boxes of 100 and guarantees that not more than 4 pins will be defective. What is the probability that the box will meet the guaranteed quality? In how many boxes out of 1000 he will meet the guaranteed quality?

26. The average number of phone calls/minute coming into a switch board between 2 and 4 P.M. is 2.5 . Determine the probability that during one particular minute there will be a) 0 ,b) 1 ,c) 2 d) 3 ,e) 4 or fewer, f) more than 6,g) at most 5,h) at least 20 calls.

27. Suppose that on the average one person in 1000 makes a numerical error in preparing Income tax return (ITR). If 10000 forms are selected at random and examined, find the probability that 6, 7 or 8 of the forms will be in error.

28. Fit a Poisson Distribution to the following data

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 3 | 4 |
| Frequencies | 30 | 62 | 46 | 10 | 2 |

29. Fit a Poisson Distribution to the following data

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. of deaths | 0 | 1 | 2 | 3 | 4 |
| Frequencies | 123 | 59 | 14 | 3 | 1 |

30. Using Poisson distribution find the approximate value of



31. If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2,000 individuals, more than two will get a bad reaction.

32. The number of road construction projects that take place at any one time in a certain city follows a Poisson distribution with a mean of 3. Find the probability that exactly five road construction projects are currently taking place in this city.