

K. J. Somaiya College of Engineering

(A Constituent College of Somaiya Vidyavihar University)

Poisson Distribution:

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Examples For Practice

1. Find the probability that at most 4 defective bulbs will be found in a box of 200 bulbs if it is known that 2% of the bulbs are defective.
2. A manufacturer who produces medicine bottles finds 0.1% of bottles are defective. The bottles are packed in boxes containing 500 bottles. A drug manufacturer buys 100 boxes from the producer of bottles. Find how many boxes contain (i) No defective bottle (ii) At least two defective bottles.
3. If the mean number of serious accidents per year In a large factory is 5, find the probability that in the current year: a) Exactly seven accidents, b) Ten or more accidents, C) No accident d) Fewer than five accidents
4. In one town 10 accidents took place in a span of 50 days, assuming that number of accidents per day follows Poisson distribution. Find the probability that there will be three or more accidents in a day.
5. In a certain population on average 13 new cases of cancer are diagnosed each year. If the annual incidence of cancer follows Poisson distribution, find the probability that in a given year the number of newly diagnosed cases of cancer will be a) Exactly 10, b)at least 8,c)No more than 12,d)between 9 and 15, inclusive, e)Fewer than 7
6. A car hire firm has three cars which it hires out day by day. The number of demands for a car on each day is distributed as Poisson variate with mean 1.5. Calculate the proportions of days on which i) neither car is used, ii) some demands are refused.
7. An insurance company found that only 0.01% of the population is involved in a certain type of accident each year. If its 1000 policy holders were randomly selected from the population, what is the probability that no more than two of its clients are involved in such accident next year?

8. In a certain factory producing certain articles the probability that an article is defective is $1/400$. The articles are supplied in packets of 10. Find approximately the number of packets in consignment of 20,000 packets containing i) no defective ii) one defective iii) two defective blades using a) Binomial distribution b) Poisson approximation to Binomial distribution.
9. In a certain factory turning out blades there is a small chance of $1/150$ for a blade to be defective. The blades are supplied in packets of 10. Calculate the approximate number of packets containing i) no defective, ii) one defective, iii) two defective blades in a consignment of 10,000 packets using a) Binomial distribution, b) Poisson approximation to Binomial distribution.
10. The manufacturer of certain articles knows that on average 5% of the articles are defective. He sells them in boxes of 100 and guarantees that no more than 4 articles will be defective. In how many boxes out of 1000 he will meet the guaranteed quality?
11. In a certain factory producing certain articles the probability that an article is defective is 0.002. The articles are supplied in packets of 20. Find approximately the number of packets containing no defective, one defective, two defective in a consignment of 20,000 packets.
12. If X and Y are independent Poisson variates such that $P(X = 1) = P(X = 2)$ and $P(Y = 3) = P(Y = 2)$ then find variance of $3X - 4Y$.
13. If X and Y are Poisson variates with parameter 3 and 4, find the variance of $3X - 4Y$.
14. If X and Y are independent Poisson variates such that $P(X = 1) = P(X = 2)$ and $P(Y = 3) = P(Y = 2)$ then find variance of $2X - 3Y$.
15. If X and Y are Poisson variates with parameters 4 and 5 respectively then find mean of $X+Y$ And $P(X + Y \geq 4)$
16. If X and Y are Poisson variates with parameters 2 and 4 respectively then find mean of $X+Y$ and $P(X + Y \geq 3)$
17. Using Poisson distribution find the approximate value of ${}^{300}C_2(0.02)^2(0.98)^{298} + {}^{300}C_3(0.02)^3(0.98)^{297}$

Ex. A computer while calculating the correlation coefficient between two variables, x and y obtained the following results:

$$n=25, \sum x = 125, \sum x^2 = 650, \sum y = 100, \sum y^2 = 460, \sum xy = 508$$

It was, however, discovered at the time of checking that it had copied down two pairs of observations as (6,14) and (6,8) in place of correct pairs (8,12) and (8,6). Obtain the correct value of coefficient of correlation. [Ans:0.67]