Department of Computer Science,
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BSCS: 306: Probability and Statistical Methods

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Assignment: 02(B): Poisson Distribution

Q 1. On the average a certain intersection results in 3 traffic accidents per month. What is the probability that in any given month at this intersection
(a). Exactly 5 accidents will occur?
(b). Less than 3 accidents will occur?
(c). At least 2 accidents will occur?

Q 2. A secretary makes 2 error per page on the average. What is the probability that on the next page she makes
(a). 4 or more errors?
(b). No error?

Q 3. A certain area of the eastern United States is, on the average, hit by 6 hurricanes a year. Fin the probability that in a given yea this area will be hit by
(a). Fewer than 4 hurricanes
(b). Anywhere from 6 to 8 hurricanes.

Q 4. The average number of oil tankers arriving each day at a certain port city is known to be 10. The facilities at the port can handle at most 15 tankers per day. What is the probability that the port is unable to handle at the tankers arrive
(a). On a given day?
(b). On one of the next 3 days? (Hint: Use Binomial distribution).

Q 5. A restaurant prepares a tossed salad containing on the average 5 vegetables. Find the probability that the salad contains more than 5 vegetables
(a). On a given day;
(b). On 3 of the next 4 days;

Q 6. The probability that a person dies from a certain respiratory infection is 0.02. Find the probability that fewer than 5 of the next 2000 so infected will die.

Q 7. Suppose that on the average 1 person in 1000 makes a numerical error in preparing his income tax return. If 10,000 forms are selected at random and examined, find the probability that 6, 7 or 8 of the forms will be in error.

Q 8. The probability that a student fails the screening test for scoliosis (curvature of the spine) at a local high school is known to be 0.004. Of the next 1875 students who are screened for scoliosis, find the probability that
(a). Fewer than 5 fails the test;
(b). 8, 9 or 10 fail the test.

Q 9. The average number of cars arriving at a petrol station is 2 per minute. What is the probability that at any randomly selected one-minute period, 4 cars will arrive at the station?

Q 10. In a certain factory turning razor blades. There is a small chance 1/500 for any blade to be defective. The blades are supplied in packets of 10. Use Poisson distribution to calculate the number of packets containing no defective, one defective and two defective blades respectively in a consignment of 10,000 packets.

Q 11. If X follows a Poisson distribution so that:
3P(X = 1) = P (X = 2), find P (X = 4)

Q 12. A random variable X follows a Poisson distribution such that its *mean is equal to its standard deviation*. Calculate the probability that:
(a). P (X = 0);
(b). P (X = 2);
(c). P (X = 4).

Q 13. Let X be a Poisson variate such that, P (X = 2) = 5/4 P (X = 3) + 3P (X = 4). Find Variance of X

Q 14. At a busy traffic intersection the probability "p" of an individual car having an accident is very small, say p = 0.0001. However, during a certain part of the day say between 4 p.m and 6 p.m a large number of cars pass through intersection say 1000. Under these conditions, what is the probability?
(a). At least 3 accidents
(b). Between 3 to 5 accidents.

Q 15. In a screw manufacturing company, there is a chance of 1/1000 for any screw to be defective. The screws are supplied in packets of 50. Calculate the number of packets containing
(a). No defective;
(b). Two defective;
(c). Less than 4 defectives in a consignment of 10,000 packets.

Q 16. If X and Y are two independent Poisson variate with parameters 2 and 3 respectively the n find P (X+Y = 4).

Q 17. Flaws in a certain type of drapery material appear on the average of one in 150 square foot. If we assume the Poisson distribution, find the probability of at most one flaw in 225 square feet.

Q 18. A book containing 400 pages is known to have 20 misprints. Find the probability that a given page contains at least 2 misprints.

Q 19. On the average number of fatal accidents per day in Karachi is three. Find the probability that on a certain day more than two such accidents would occur.