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Assignment 2: Binomial distribution, Poisson Distribution

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Q.1 Define binomial distribution. Derive mean, variance and standard deviation of the binominal distribution.

Q.2 What is poisson distribution. Discuss limiting form of binomial distribution. Find mean and variance of poisson distribution.

Q.3 A dice is tossed 6 times if getting an odd number is a success find the probability of (1) 5 success (2) at least 5 success (3) at the most 5 success.
Ans: 3/32, 7/64, 63/64

Q.4 The probability of a bomb hitting a bridge is 1/5. Two bombs are enough to destroy the bridge. If 6 bombs are aimed at the bridge. What is the prob. That the bridge will be destroy?
Ans:

Q.5 A random variable X follows binomial distribution with variance 1.44 and mean 2.4. Find $p(1<X<4)$, $P(x=3)$ and $P(X>5)$.

Q.6 In an industry out of 6 workers two workers have a chance of suffering from the diseases due to the production in the industry. Out of 5 worker what is the probability of 2 worker who suffer from the diseases. Ans: 0.32

Q.7 It is known that the probability of an item produced by a certain machine will be defective is 0.01. Show that a sample of 100 items selected at random from the total output will contain no more than one defective item has probability 2/e.

Q.8 In a factory manufacturing razor blades, it is found that there is a small chance of 1/500 for any blade to be defective blades are supply in a packet containing 10 blades. Find the approximate number of packets containing (1) no defective (2) one defective blade in the consignment of 10,000 packets.

Q.9 An underground mine has 5 pumps installed for pumping out storm water, the prob. of any one of the pumps failing during the storm is 1/8. What is the probability that

(i) At least 2 pumps will be working

(ii) All the pumps will be working during a particular storm?

Ans: 8183/8192, 16807/32768

Q.10 10% of the total produced in a certain manufacturing process turned out to be defective. Find the probability that in a sample of 10 tools selected at random exactly 2 will be defective by using Poisson distribution. Ans: 0.1839

Q.11 The number of defects per unit in a sample of 330 units of manufactured product was found as follows:

No. of defects:	0	1	2	3	4
No. of units:	214	92	20	3	1

Fit a Poisson distribution to the data and test for goodness of fit. (given e-0.439 = 0.6447)

Q.12 The following data show the number of seeds germinating out of 10 on damp filter for 80 set of seeds. Fit a binomial distribution to this data:

x:	0	1	2	3	4	5	6	7	8	9	10
y:	6	20	28	12	8	6	0	0	0	0	0

Q.13 Eight coins are tossed at a time 256 times. Number of heads observed at each throw is recorded and the results are given below. Find the expected frequencies. What are the theoretical values of mean and standard deviation? Calculate also the mean and s.d of observed frequencies.

Q.14 A box contains 100 transistors, 20 of each are defective, 10 are selected for inspection. Find the prob. that (i) all 10 are defective, (ii) all 10 are good (iii) at least one is defective (iv) at the most 3 are defective. Ans: $1/(5)^{10}$, $1 - 1/(5)^{10}$, 0.9, 0.879.