# Probability Theory

## Practice Assignment

## Discrete distributions

1. In a game of chance, a large spinner with the numbers 1–20 is spun.

(a) Discuss about its probability distribution.

(b) Find the probability that the number X drawn is

(i) even number (ii) a number greater than 18

(c) Find the mean and variance of random variable X.

2. If 3 of 20 tyres are defective and 4 of them are randomly chosen for inspection. what is the probability that only one of the defective tyre will be included.

(b) what is its probability distribution. Also find mean and variance of the random variable

3. Given that $X \sim Bin(9, 0.75)$. Calculate

(i) $P(X<8)$

(ii) $P(2 \leq x < 4)$

(iv) $E[X]$

(ii) $Var[X]$

4. The number of radio active particles emitted per hour has a poisson distribution with $\lambda = 25$ find mean and standard deviation of the number of particles emitted in an hour.

5. Given that $X \sim Pol(1.8)$ Calculate

(i) $P(x \geq 1)$

(ii) $P(X = 4)$

(iii) $P(2 \leq x < 5)$

(iv) $E[X]$

(v) $Var[X]$

6. The mean number of accidents in a year on NH-5 highway is 5. Calculate the probability that

(i) there are exactly 7 accidents on NH-5 in any given year

(ii) there are more than 3 accidents on NH-5 in any given year

7. A small company receives home insurance claims at a rate of 3 per month. Calculate the probability that they receive 20 claims in a year.

8. If the probability that an individual suffers a bad reaction due to a certain medicine is 0.001.

(a) what is its probability distribution if a sample of 2000 individuals are taken.

(b) Determine the probability that more than 2 individuals

will suffer a bad reaction

(c) Find E[X], Var[X].

9. If two dice are rolled until '6' appears on both dice.

(a) Discuss about its probability distribution

(b) what is the probability that it will take atleast 4 rolls.

(10.) Find the expected value and the variance of the number of times one must throw a die until the outcome 'i' has occured 4 times.

(a) Discuss about its probability distribution.