Problems for the Session on 19 October 2020

1. X is a random variable with CDF F(x). Then show that random variable defined by Y= F(X) follows Uniform distribution for interval (0,1).

2. At least half of an airplane's engines are required to function in order for it to operate. If each engine independently functions with probability p, for what values of p is a 4-engine plane is more likely to operate than a 2-engine plane?

3. Approximately 80,000 marriages took place in the state of Maharashtra last year. Estimate the probability that for at least one of these couples

    a. both partners were born on 31 December;

    b. both partners celebrated their birthday on the same day of the year.

4. A manufacturer produces bolts that are specified to be between 1.19 inches and 1.21 inches in diameter. If its production process results in a bolt's diameter being normally distributed with mean 1.20 inches and standard deviation of 0.005 inches, what percentage of bolts will not meet the specifications?

5. The number of years a radio functions is exponentially distributed with parameter $\lambda = \frac{1}{8}$. If Ramesh buys a used radio, what is the probability that it will be working after an additional 10 years?

6. If X and Y are independent Chi-squared random variables with 3 and 6 degrees of freedom respectively, determine the probability that X+Y will exceed 10.