ASSIGNMENT

1. Define continuous random variable.

2. Let X follows continuous uniform distribution over the interval (2, 7). What is the probability (i) P($|X| < 3$),(ii) P($X > 3$).

3. The pdf of a random variable X is f(x) = 1/7, $3 < x < k$. Find k and the variance of the distribution.

4. Let X follows exponential distribution with mean 3.5. Find (i) P($X < 5$), (ii) P($|X| > 2$).

5. You have two light bulbs. The life length of each bulb (in hours) is a continuous random variable *X* with probability density function $f(x) = 2e^{-2x}, x > 0$.The two bulbs are allowed to burn independently of each other. Find the probability that both bulbs will *each* last at least one hour.

6. Suppose that an integrated circuit has a life length *X* (in units of 1000 hours) that is a continuous random variable with probability density function $f(x) = 3e^{-3x}, x > 0$.
An integrated circuit considered defective if its life length is less than 3000 hours. The life lengths of any two integrated circuits are independent random variables. A batch of 100 integrated circuits is tested. Find the expected number of defective items.

7. Let X follows normal distribution with mean 2 and variance 9. Find (i) P($X^2 > 9$), (ii) P (-1.7 < X < -0.5), and (iii) P(-1.5 <, X < 3.5).

8. The time needed to complete a final examination in a particular college course is normally distributed with a mean of 80 minutes and a standard deviation of 10 minutes. Answer the following questions.

(i) What is the probability of completing the exam in one hour or less?

(ii) What is the probability that a student will complete the exam in more than 60 minutes but less than 75 minutes?

(iii) Assume that the class has 60 students and that the examination period is 90 minutes in length. How many students do you expect will be unable to complete the exam in the allotted time?

9. Suppose that the breaking strength of cotton fabric (in pounds), say X, is normally distributed with $E(X) = 165$ and $\text{Var}(X) = 9$. Assume further more that a sample of this fabric is considered to be defective if $X \leq 162$.What is the probability that a sample of fabric, chosen at random, will be defective?