MTL 106 (Introduction to Probability and Stochastic Processes)

II Semester 2016-17

Tutorial Sheet 3

Function of Random Variables

1. Let X be uniformly distributed random variable over the interval [0, 10]. Find the CDF of Y = max{ 2, min{4, X} }.
2. Let X be a random variable with pdf , x > 0 where θ > 0 and α > 0. Find the distribution of random variable Y = ln ()

3. Suppose that X is a continuous random variable with pdf fX(x) = for x > 0. Define

1. Discuss whether the distribution of Y is discrete or continuous or mixed type.
2. Determine the pmf/pdf as applicable to this case.

4. Consider the marks of MTL 106 examination. Suppose that marks are distributed normally with mean 76 and standard deviation 15. 15% of the best students obtained A as grade and 10% of the worst students fail in the course. (a) Find the minimum mark to obtain A as a grade. (b) Find the minimum mark to pass the course.

5. Consider a nonlinear amplifier whose input X and output Y are related by its transfer characteristic

Find pdf of Y if X has N(0,1) distribution.

6. Let X be a uniformly distributed random variable on the interval [a, b] where . Find the distribution of the random variable Y = where µ = E(X) and = Var(X). Also, find P(-2 < Y < 2).

7. Let X be a random variable having a binomial distribution with parameters n and p. Prove that

8. Let X be a continuous random variable with CDF FX(x). Define Y = FX(X).

1. Find the distribution of Y.
2. Find the variance of Y, if it exist?

9. Let X be an exponentially distributed random variable with parameter λ > 0. Find

P( |X – 1| > 1 | X > 1)