Method of Distribution Functions

1. Let *X* be a random variable with probability density function given by



1. Find the density function of *Y1* = 2*X* – 1 .
2. Find the density function of *Y2* = 1 – 2*X*.
3. Find the density function of *Y3* = *X* 2.
4. Find *E(Y1),* *E(Y2)* and *E(Y3)* by using the derived density functions for these random variables.
5. Find *E(Y1),* *E(Y2)* and *E(Y3)* using *E(X)* and / or *E(X2).*

2. Let *X* be a random variable with probability density function given by



1. Find the density function of *Y1* = 3*X*.
2. Find the density function of *Y2* = 3 - *X*.
3. Find the density function of *Y3* = *X* 2.
4. A supplier of kerosene has a weekly demand *X* possessing a probability density function given by



with measurements in hundreds of gallons.

The supplier’s profit is given by *Y* = 10*X* – 4.

1. Find the probability density function for *Y*
2. Use the answer to (a) to find *E(Y).*
3. Find *E(Y)* using *E(X).*
4. The waiting time *X* until delivery of a new component for an industrial operation is uniformly distributed over the interval from 1 to 5 days. The cost of this delay is given by *Y* = 2*X*2 + 3. Find the probability density function for *Y*.
5. A member of the power family of distributions has a distribution function given by



where α, θ > 0. Find the density function.

1. A member of the Pareto family of distributions ( often used in economics to model income distribution function given by



where α, β > 0. Find the density function

1. Let the random variable *X* possess a uniform distribution on the interval [0,1].
   * 1. Derive the distribution of the random variable *Y* = *X*2.
     2. Derive the distribution of the random variable *Y* = √*X*

1. If the probability density of X is given by 

Find the probability density of Y = X 3.

1. If the probability density of X is given by 

and Y = X 2, find the

* + - 1. distribution function of Y,
      2. the probability density of Y