**Definition 3.9**

**Definition 3.10 A random variable Y is to have a hypergeometric probability distribution if and only if**

where Y is the integer 0, 1, 2, n, subject to the restrictions y ≤ r and n − y ≤ N − r.

**Definition 3.11 A random variable Y is said to have a Poisson probability distribution if and only if**

**Definition 4.3**

Let F(y) be the distribution function for a continuous random variable Y. Then f (y), given by

Wherever the derivative exists, is called the probability density function for the random variable Y

**Definition 4.6**

If θ1 < θ2, a random variable Y is said to have a continuous uniform probability distribution on the interval (θ1, θ2) if and only if the density function of Y is

**Definition 4.9 A random variable Y is said to have a gamma distribution with parameters α > 0 and β > 0 if and only if the density function of Y is**

where

**Definition 4.11 A random variable Y is said to have an exponential distribution with parameter β > 0 if and only if the density function of Y is**

**Definition 4.12 A random variable Y is said to have a beta probability distribution with parameters α > 0 and β > 0 if and only if the density function of Y is**

Were

**Definition 4.13 If Y is a continuous random variable, then the kth moment of the origin is given by**

The kth moment of the mean, or the kth central moment, is given by

**Definition 5.1**

Let Y1 and Y2 be discrete random variables. The joint (or bivariate) probability function for Y1 and Y2 is given by

**Definition 5.2 For any random variables Y1 and Y2, the joint (bivariate) distribution function F(y1, y2) is**

**Definition 5.3**

Let Y1 and Y2 be continuous random variables with joint distribution function F (y1, y2). If there exists a nonnegative function f (y1, y2), such that

for all −∞ < y1 < ∞, −∞ < y2 < ∞, then Y1 and Y2 are said to be jointly continuous random variables. The function f (y1, y2) is called the joint probability density function.

**Definition 5.5**

If Y1 and Y2 are jointly discrete random variables with joint probability function p (y1, y2) and marginal probability functions p1(y1) and p2(y2), respectively, then the conditional discrete probability function of Y1 given Y2 is

provided that p2(y2) > 0

**Definition 5.7**

Let Y1 and Y2 be jointly continuous random variables with joint density f (y1, y2) and marginal densities f1(y1) and f2(y2), respectively. For any y2 such that f2(y2) > 0, the conditional density of Y1 given Y2 = y2 is given by

and, for any y1 such that f1(y1) > 0, the conditional density of Y2 given Y1 = y1 is given by