FormulaSheet2

**Definition 3.9**

**Definition 3.10**

A random variable Y is said to have a hypergeometric probability distribution if and only if

where y is an 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

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**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

**Definition 5.8**

Let Y1 have distribution function F1(y1), Y2 have distribution function F2(y2), and Y1 and Y2 have joint distribution function F(y1, y2). Then Y1 and Y2 are said to be independent if and only if

for every pair of real numbers (y1, y2). If Y1 and Y2 are not independent, they are said to be dependent.