Applied Stats Formula Sheet Cont.

Def 3.9)

A random variable *Y* is said to have a *negative binomial probability distribution* if and only if

Def 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  and .

Def 3.11)

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

Def 4.1)

Let *Y* denote any random variable. The *distribution function* of *Y*, denoted by *F*(*y*), is such that for .

Def 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*.

Def 4.5)

The expected value of a continuous random variable *Y* is

Provided that the integral exists.

Def 4.6)

If , a random variable *Y* is said to have a continuous *uniform probability distribution* on the interval if and only if the density function of *Y* is

Def 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

Def 4.10)

Let *v* be a positive integer. A random variable *Y* is said to have a *chi-square distribution with v degrees of freedom* if and only if *Y* is a gamma-distributed random variable with parameters and

Def 4.11)

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

Def 4.12)

A random variable *Y* is said to have a *beta probability distribution with parameters* and if and only if the density function of *Y* is

Where

Theorem 4.13)

**Tchebysheff’s Theorem** Let *Y* be a random variable with finite mean *µ* and variance . Then, for any *k* > 0,

or

Def 5.1)

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

Def 5.2)

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

Def 5.3)

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

For all - then Y1 and Y2 are said to be *jointly continuous random variables*. The function is called the *joint probability density function*.

Def 5.5)

If Y1 and Y2 are jointly discrete random variables with joint probability function and marginal probability functions *p*1(*y*1) and *p2*(*y*2), respectively, then the *conditional discrete probability function* of *Y*1 given *Y*2 is

Provided that *p*2(*y*2) > 0.

Def 5.6)

If *Y*1 and *Y*2 are jointly continuous random variables with join density function then the *conditional distribution function* of *Y1* given *Y*2 = *y*2 is

Def 5.7)

Let *Y*1 and *Y*2 be jointly continuous random variables with joint density and marginal densities and , respectively. For any *y*2 such that , the conditional density of *Y*1 given *Y*2 = *y*2 is given by

And, for any *y*1 such that the conditional density of *Y*2 given *Y*1 = *y*1 is given by