**Poisson**

**Expected**

**Variance**

**STD**

**Tchebysheff’s Theorem**

**Distribution Function**

**Properties**

is a nondecreasing function of y. (If y1 and y2 are any values such that y1 < y2, then )

**Probability Density Function**

**Properties**

**Y falling between interval [a,b]**

**Continuous Random Variable Expected**

**Thm 4.4**

**Thm 4.5**

Let c be a constant and let be functions of a continuous random variable Y. Then the following results should hold:

1. .

**Variance**

**STD**

**Uniform Probability Distribution**

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

**Variance and STD**

**Normal Probability Distribution**

A random variable Y is said to have a normal probability distribution if and only if, for and , the density function of Y is

**Expected**

**Variance & STD**

**Gamma Probability Distribution**

A random variable is said to have a gamma distribution with parameters if and only if the density function of is

where

**Expected**

**STD and Variancee**

**Chi-Square**

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

**Expected**

**STD and Variance**

**Exponential Distribution with parameter**

A random variable is said to have a exponential distribution with parameters if and only if the density function of is

**Expected**

**STD and Variance**

**Beta Probability Distribution**

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

where

**Expected**

**STD & Variance**

**Joint Probability Function**

Let be discrete random variables. The for is given by

**Thm 5.1**

If are discrete random variables with joint probability function , then

1. , where the sum is over all values that are assigned nonzero probabilities.

**Discrete**

For any random variables , the joint (bivariate) distribution function is

**Joint Probability Density Function**

Let be continuous random variables with joint distribution function . If there exists a nonnegative function , such that

For all , then are said to be jointly continuous random variables. The function is called the joint probability density function.

**Thm 5.2**

If are random variables with joint distribution function , then

1. If and , then

**Cont.**

If are jointly continuous variables with a joint density function given by , then

1. for all

**Marginal Probability Function**

1. Let be jointly discrete random variables with probability function given by Then the marginal probability functions of , respectively, are given by
2. Let be jointly continuous random variables with joint density function given by . Then the marginal density functions of , respectively, are given by

**Conditional Discrete Probability Function**

If are jointly random variables with joint probability function and marginal probability functions and , respectively, then the conditional discrete probability functionof is

Provided that

**Conditional Distribution Function**

If are jointly continuous variables with joint density function, then the conditional distribution functionof is

**Conditional Density**

Let be jointly continuous variables with joint density function, and marginal densities and , respectively. For any such that , the conditional density of is given by

And, for any such that , the conditional density of is given by

**Independent Random Variables Distribution Function**

Let have distribution function have distribution function and have joint distribution function . Then are said to be independent if and only if

For every pair of real numbers

If are not independent, they are said to be *dependent*.

**Thm 5.4**

If are discrete random variables with joint probability function and marginal probability functions and respectively, then are independent if and only if

For every pair of real numbers

If are continuous random variables with joint density function and marginal density functions and respectively, then are independent if and only if

For every pair of real numbers

**Thm 5.5**

Let have a joint density function that is positive if and only if , for constants a, b, c, and d; and otherwise. Then are independent random variables if and only if

Where is a nonnegative function of alone and is a nonnegative function of alone.