**Chapter 1**

**Definition 1.1**

This finds the *mean* of a sample:

**Definition 1.2**

This finds the *variance* of a sample:

2

This finds the *variance* of a population:

2

**Definition 1.3**

This finds the *standard deviation* of a sample:

This finds the *standard deviation* of a population:

**Chapter 2**

**Theorem 2.1**

This finds all pairs containing one element from each group of elements using the *mn rule*:

**Theorem 2.2**

This is the *permutation* formula:

**Theorem 2.3**

This partitions n distinct objects into k distinct groups using *combinatorial analysis*:

**Theorem 2.4**

This is the *combinations* formula:

**Definition 2.9**

This is the *conditional probability* of an event A, given that an event B has occurred:

**Definition 2.10**

These are the indications of *independence* in two events A and B:

**Theorem 2.5**

This is the *Multiplicative Law of Probability*:

If events A and B are independent, then:

**Theorem 2.6**

This is the *Additive Law of Probability*:

If events A and B are mutually exclusive:

**Theorem 2.7**

This is the *complement* of an event:

**Definition 2.11**

This is the *partition* of S:

**Theorem 2.8**

This is the *Law of Total Probability*:

**Theorem 2.9**

This is *Baye’s Rule*:

**Chapter 3**

**Definition 3.2**

This is the *sum of the probabilities* of all sample points in S:

**Definition 3.4**

This is the *expected value* of Y if Y is a discrete random variable:

**Definition 3.5**

This is the *variance* of a random variable Y:

**Theorem 3.6**

This is the *variance* breakdown:

**Definition 3.6**

These are the properties of a *binomial experiment*:

This is the *probability of success*:

This is the *probability of failure*:

**Definition 3.7**

This is the representation of *binomial probability distribution*:

**Theorem 3.7**

This is the *expected value* of a binomial probability distribution:

This is the *variance and standard deviation* of a binomial probability distribution:

**Definition 3.8**

This is the *geometric probability distribution* of a random variable Y:

**Theorem 3.8**

This is the *expected value* of a geometric probability distribution of a random variable Y:

This is the *variance* of a geometric probability distribution of a random variable Y:

**Definition 3.10**

This is the mass function for *hypergeometric probability distribution*:

**Theorem 3.10**

This is the *expected value* of a random variable with hypergeometric probability distribution:

This is the *variance* of a random variable with hypergeometric probability distribution:

**Definition 3.9**

This is the *negative binomial probability distribution* of a random variable Y:

**Theorem 3.9**

This is the *expected value* for a random variable Y:

This is the *variance* for a random variable Y:

**Definition 3.11**

This is the representation of a *Poisson probability distribution*:

**Theorem 3.11**

This is the *expected value, variance, and standard deviation* of Poisson probability distribution:

**Theorem 3.14**

This is *Tchebysheff’s Theorem*, also known as *Chebyshev’s Theorem*:

or

**Personal Note**

This is what *k* represents in Theorem 3.14:

**Chapter 4**

**Definition 4.1**

This is the *distribution function* of Y:

**Definition 4.3**

This is the *distribution function for a continuous random variable Y*:

**Theorem 4.3**

This is the *interval probability function distribution of Y falling on an interval [a, b]*:

**Definition 4.5**

This is the *expected value* of a continuous random variable Y involving integrals:

**Theorem 4.4**

This is the expected value of a continuous function g(y) involving integrals:

**Theorem 4.5**

The following are true about a *continuous random variable Y* and a *constant c*:

**Definition 4.6**

This is the *uniform probability distribution probability density function* in the range of [a, b]:

**Personal Note**

The following are all equal:

**Theorem 4.6**

This is the *expected value* and *variance* of uniform distribution:

**Definition 4.9**

This is a *gamma distribution* with parameters alpha and beta:

*Tau* is represented with the following integral:

**Theorem 4.8**

The *expected value and variance* of a gamma distribution is as follows:

**Definition 4.11**

This is the *exponential distribution* of a random variable Y:

**Theorem 4.10**

This is the *expected value and variance* of an exponential distribution when :

**Chapter 5**

**Definition 5.1**

This is the *joint (or bivariate) probability function* for Y1 and Y2:

**Definition 5.2**

This is the *joint (bivariate) distribution function* of F(y1, y2):

**Definition 5.3**

If the following is true, then X and Y are *jointly continuous random variables* with f(x, y) representing the *joint probability density function*:

**Definition 5.4**

The *marginal probability functions* of X and Y are:

The *marginal density functions* of X and Y are:

**Definition 5.5**

The *conditional discrete probability function* for X and Y is:

**Definition 5.6**

This is the *conditional distribution function* of X given Y = y:

**Definition 5.7**

This is the *conditional density* of X and Y:

**Definition 5.8**

This determines *independency* between X and Y:

**Theorem 5.4**

This determines *independency* between joint probability functions and marginal probability:

This determines *independency* between joint density functions and marginal density:

**Theorem 5.5**

This determines *independency* of two separate functions: