Formula Notation

**Definition 1.1**

This finds the mean of a sample:

**Definition 1.2**

This finds the variance of a sample:

**Definition 1.3**

This standard deviation of a sample of measurements it the positive square root of the variance.

s =

The corresponding *population* standard deviation is denoted by:

**Empirical Rule**

For a distribution of measurements that is approximately normal (bell shaped), it follows that the interval with end points:

contains approximate 60% of the measurements.

2 contains approximate 95% of the measurements.

3 contains almost all of the measurements.

**Definition 2.6**

Suppose S is a sample space associated with an experiment. To every event A in S (A is a subset of S), we assign a number, P(A), called the probability of A, so that the following axioms hold:

Axiom 1: P(A) 0

Axiom 2: P(S) = 1

Axiom 3: If form a sequence of pairwise mutually

Exclusive events in S (that is, ), then:

…) =

**Definition 2.7**

An ordered arrangement of r distinct objects is called a permutation. The number of ways of ordering *n* distinct objects taken r at a time will be designated by the symbol:

**Theorem 2.3**

The number of ways of partitioning *n* distinct objects into *k* distinct groups containing objects, respectively, where each object appears in exactly one group and , is:

**Definition 2.8**

The number of *combinations* of *n* objects taken *r* at a time is the number of subsets, each of size *r*, that can be formed from the *n* objects. This number will be denoted by:

**Theorem 2.4**

The number of unordered subsets of size *r* chosen (without replacement) from *n* available objects is:

**Definition 2.9**

The *conditional probability of an event* A, given that an event B has occurred, is equal to:

Provided P(B) > 0. [The symbol P(A|B) is read probability of “A given B”]

**Definition 2.10**

Two events A and B are said to be *independent* if any one of the following holds:

**Theorem 2.5**

**The Multiplicative Law of Probability**

The probability of the intersection of two events A and B is:

If A and B are independent, then:

**Theorem 2.6**

**The Additive Law of Probability**

The probability of the union of two events A and B is:

If A and B are mutually exclusive events, then:

**Theorem 2.7**

If A is an event, then:

**Theorem 2.9**

**Bayes’ Rule**

Assume that { is a partition of S such that,

then:

**Theorem of Total Probability**

**Definition 3.2**

The probability that Y takes on the value, , is define as the *sum of the probabilities of all sample points in S* that are assigned the value y. We will sometimes denote this:

**Definition 3.4**

Let *Y* be a discrete random variable the with the probability function *p(y).* Then the expected value of *Y, E(Y),* is defined to be:

**Definition 3.7**

A random variable *Y* is said to have a *binomial distribution* based on *n* trials with success probability *p* if and only if:

,

**Expected Value for Binomial Distribution**

**Standard Deviation for Binomial Distribution**

**Definition 3.8**

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

**Theorem 3.8**

If *Y* is a random variable with geometric distribution:

**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 restriction,

**Theorem 3.10**

If *Y* is a random variable with a hypergeometric distribution:

**Definition 3.9**

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

**Theorem 3.9**

If Y is a random variable with a negative binomial distribution, then: