Formula Sheet

Mean of a sample space

**Def 1.1**

The mean of a sample of n measured responses y1, y2,..., yn is given by

Variance of a sample space

**Def 1.2**

The variance of a sample of measurements y1, y2,..., yn is the sum of the square of the differences between the measurements and their mean, divided by *n* − 1. Symbolically, the sample variance is

Standard Deviation of a sample space

**Def 1.3**

The standard deviation of a sample of measurements is the positive square root of the variance; that is,

Permutation

**Def 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

Combination

**Def 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 or .

Conditional Probability

**Def 2.9**

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

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

Bayes Theorem

**Th 2.9**

**Bayes’ Rule** Assume that {B1, B2,..., Bk} is a partition of *S* such that *P(*Bi*) > 0*, for *i* = 1, 2,..., *k*. Then

Independence of A and B

**Def 2.10**

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

Binomial Distribution

**Def 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

, *y* = 0, 1, 2,..., *n* and 0 ≤ *p* ≤ 1

Geometric Distribution

**Def 3.8**

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

, *y* = 0, 1, 2, 3..., *n* and 0 ≤ *p* ≤ 1

Hypergeometric Distribution

**Def 3.8**

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

Poisson Distribution

**Def 3.11**

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

, *y* = 0, 1, 2,..., λ > 0

Negative Binomial Distribution

**Def 3.9**

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

Tchebysheff’s Theorem

**Th 3.11**

**Tchebysheff’s Theorem** Let *Y* be a random variable with mean *μ* and finite variance *σ2*. Then, for any constant k > 0,

*P(|Y − µ| < kσ) ≥ 1 −* or *P(|Y − µ| ≥ kσ) ≤*