Formula Sheet

Definition 1.1 Mean

Definition 1.2 Variance

Definition 1.3 Standard Deviation

Definition 2.1

An *experiment* is the process by which an observation is made.

Definition 2.2

A *simple event* is an event that cannot be decomposed. Each simple event corresponds to one and only one *sample point*. The letter *E* with a subscript will be used to denote a simple event or the corresponding sample point.

Definition 2.3

The *sample space* associated with an experiment is the set consisting of all possible sample points.

Definition 2.4

A *discrete sample space* is one that contains either a finite or a countable number of distinct sample points.

Definition 2.5

An *event* is a discrete sample space *S* is a collection of sample points--that is, any subset of *S*.

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:

Axiom 2:

Axiom 3: If form a sequence of pairwise mutually exclusive events in *S* (that is if i ≠ j), then

Definition 2.7 Permutations

Theorem 2.3 Multinomial Coefficients

Definition 2.8 Combinations

Definition 2.9 Conditional Probability

Definition 2.10

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

Otherwise they are said to be independent

Theorem 2.5 Multiplicative Law of Probability

Theorem 2.6 Additive Law of Probability

If A and B are mutually exclusive events then,

Theorem 2.7

If A is an event, then

Definition 2.11 and Theorem 2.8 Law of Total Probability

Theorem 2.9 Bayes Theorem

Definition 3.4 Expected Value of Y

Definition 3.5 Variance of Y

The standard deviation of Y is

Definition 3.7 Binomial Distribution

Definition 3.8 Geometric Distribution

Definition 3.10 Hypergeometric Distribution

Theorem 3.10

If y is a random variable with a hypergeometric distribution,

Definition 3.11 Poisson Distribution

Theorem 3.11 Expected and Variance for Poisson Distribution

If Y is a random variable possessing a Poisson Distribution with parameter λ, then

Theorem 3.14 Tchebysheff’s Theorem

Definition 4.3 Probability Density Function

Theorem 4.3

If the random variable y has a density function and , then the probability that Y falls in the interval is

Definition 4.5 Expected Value for Continuous random variable Y

Theorem 4.4 Expected Value of a Function

Let be a function of Y; then the expected value of is given by

Definition 4.6 Uniform Distribution

Theorem 4.6 Expected and Variance for Uniform Distribution

Definition 5.2 Joint Distribution Function

Definition 5.3 Joint Probability Density Function

Definition 5.4 Marginal Probability and Density Functions

Definition 5.5 Conditional Discrete Probability Function

Definition 5.6 Conditional Distribution Function

Definition 5.7 Conditional Density Function

Definition 5.8, Theorem 5.4 Independent Random Variables

Theorem 5.5 Independent Random Variables for two Non-negative Functions