Definition 1.1: Mean

Definition 1.2: Variance

Definition 1.3: Standard Deviation

Definition 2.7: Permutations

Theorem 2.3: Partitioning *n* distinct objects into *k* distinct groups

Definition 2.8: Combinations

Definition 2.9 Conditional Probability

Definition 2.10: Independent events are evident if one of the following holds:

Theorem 2.5: Multiplicative Law of Probability

If independent:

Theorem 2.6: Additive Law of Probability

If mutually exclusive:

Theorem 2.7: Compliments

Definition 2.11: Partitions

is a partition of *S.*

Theorem 2.8: Decomposition of events

Theorem 2.9: Bayes’ Rule

Definition 3.4: Expected Value

Theorem 3.2: Expected value of g(Y)

By definition 3.4,

Definition 3.5: Variance of Y

Theorem 3.3: Mean/Expected value of c

By Theorem 3.1,

Theorem 3.4: Mean/Expected value of product of c \* random variable function

By Theorem 3.2,

Theorem 3.5: Mean/Expected value of sum of random variable Y function

Theorem 3.6: Variance of discrete random variable

Definition 3.6: Binomial experiment properties:

1. Consists of a fixed number, *n,* of identical trials
2. Each trial results in one of two outcomes: success, *S,* or failure, *F.*
3. The probability of success on a single trial equates to some value *p and* remains from trial to trial. Failure is equal to *q = 1 – p*
4. The trials are independent.
5. The random variable of interest, Y, is the number of successes observed during the *n* trials.

Definition 3.7: Binomial Distribution

Theorem 3.7: Mean and Variance of Binomial Distribution

Definition 3.8: Geometric Distribution

A random variable Y has geometric probability distribution IFF

Theorem 3.8: Mean and Variance of Geometric Distribution

Definition 3.9: Negative Binomial Probability Distribution

A random variable Y is said to have a NBPD IFF

Theorem 3.9: Expected and Variance of NBPD

Definition 3.10: Hypergeometric probability distribution

Theorem 3.10: Expected and Variance of Hypergeometric

Definition 3.11: Poisson probability distribution

Theorem 3.11: Expected and Variance of Poisson

Theorem 3.14: Tchebysheff’s Theorem

Definition 4.1: Distribution for Random Variable Y

Definition 4.3: Distribution Function for Continuous Random Variable Y

Theorem 4.3: Density function f(y) and a < b

Definition 4.5: Expected of a Continuous Random Variable Y

Theorem 4.4: Let g(Y) be a function of Y, Expected Value of g(Y)

Theorem 4.5: Let c be a constant, let g(Y), g1(Y), …. gk(Y) be functions of a Continuous Random Variable Y. Said results hold:

Definition 4.6: Continuous Uniform Probability Distribution

Theorem 4.6: Expected and Variance for Uniform Distribution

Definition 4.8: Normal Probability Distribution

Theorem 4.7: Expected and Variance of Normal Probability Distribution

Definition 4.9: Gamma Distribution

Theorem 4.8: Expected and Variance of Gamma Distribution

Theorem 4.9: Chi-Square Random Variable with v Degrees of Freedom

Definition 4.11: Exponential Distribution with parameter β > 0

Theorem 4.10: Expected and Variance for Exponential Distribution

Definition 5.1: Joint Probability Function

Definition 5.2: Joint Distribution Function

Definition 5.3: Joint Distribution Function nonnegative