Formulas

**Area of a Circle**

**Variance** – how far off the average a value could be

**Standard Deviation** – the likelihood of a value deviating from the average

**Permutation** – ordering n distinct objects taken r at a time (order matters)

**Combination** – n objects taken r at a time

**Conditional Probability** – probability of A given B has occurred

**de Morgan’s Laws**

**Multiplicative Law**

**Addition Rule**

**Theorem of Total Probability** – probability of an unknown event given the known probabilities of distinct events

**Bayes Theorem** – B has not been observes given A observed

**Probability Mass Function** – the probability Y takes on the value of y

**Geometric Distribution**

Success occurs on or before the nth trial

Success occurs before the nth trial

Success occurs on or after the nth trial

Success occurs after the nth trial

Standard Deviation

**Poisson Distribution** – how many times an event is likely to occur within a period of a unit (time, area, volume, etc.)

- the total number of events (k) divided by the number of units (n) in the data (k/n)

**Chebyshev’s Theorem**

Any number , at least of the data values lie k standard deviations of the mean

**Hypergeometric Distribution** – probability of the number of successes in n draws without replacement

N – total population size

n – sample size

r – total successes

y – wanted successes

**Probability Mass Function**

- selecting y Type I items from r available

- selecting n-y Type II items from N-y available

- selecting N items

**Continuous Random Variable**

Variance =

Expected Value of Variable =

Expected Value of Function =

**Cumulative Distribution Function**

**Probability Density Function**

**Uniform Probability Distribution** – all outcomes are equally likely

on the interval -

**Normal Probability Distribution**

for and

and

**Standard Normal Random Variable**

**Gamma Probability Distribution**

where

with parameters and

and

**Exponential Probability Distribution**

A random variable Y has an exponential distribution with parameter if and only if

and

**Beta Probability Distribution**

where

with parameters and

and

**Joint/Bivariate Probability Function**

For discrete random variables and ,

For any random variables and ,

**Joint Cumulative Distribution Function**

**Joint Probability Density Function**

For continuous random variables and with joint distribution function and nonnegative function such that

for all , then and are jointly continuous random variables

**Marginal Probability Function**

**Marginal Density Function**

**Conditional Discrete Probability Function**

**Conditional Distribution Function**

**Conditional Density**

given

given

**Independent Random Variables**

and are independent if and only if for every pair of real numbers