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Formula Sheet

Definition 1.1

Mean of a sample *n* measured responses

Definition 1.2

Variance

Definition 1.3

Standard Deviation

Empirical Rule

Definition 2.6

Axiom 1

; probability of event cannot be negative.

Axiom 2

; probability of event coming from a set is always 100%

Axiom 3

Probability of pairwise exclusive events, is the sum of the probabilities.

MN Rule Theorem 2.1

Permutation =

Multinomal Coefficients Theorem 2.3

Combination

where =

Conditional Probability

P(A|B) = as long as P(B)>0

Independence if:

P(A|B)=P(A)

P(B|A)=P(B)

, otherwise dependent

Multiplicative Law of Probability

P(A)P(B|A)

P(B)P(A|B)

If A and B are independent,

General Addition Rule

Two arbitrary events A and B:

If A and B are mutually exclusive, :

Theorem 2.7

P(A)= 1-P(A’)

Theorem of Total Probability

Bayes Theorem

If 0<P(B)<1, use the Theorem of total probability

Probability Mass Function

Expectations of Discrete Random Variables: E[Y]

Variance: V[Y]

Binomial Distribution

and p(y)=0 for all other y

Expected

Standard Deviation

Geometric Distribution

E[Y]=

V[Y]=

Extra Formulas, with a probability of success p:

A success occurs on or before the trial.

A success occurs before the trial.

A success occurs on or after the trial.

A success occurs after the trial.

Hyper Geometric Distribution

also

PMF:

E[Y]=

Negative Binomial Probability Distribution

E[Y]=

Poisson Distribution

where

E[Y]=V[Y]=

Tchebysheff’s Theorem