Applied Stats Formula Sheet

Def 1.1)

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

The corresponding population mean is defined µ.

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

The corresponding population variance is denoted by the symbol ∂2

Def 1.3)

The *Standard Deviation* of a sample of measurements is the positive square root of the variance; that is,

The corresponding *population* standard deviation is denoted by .

Def 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: *P(A) >= 0*.

Axiom 2: *P(S) = 1.*

Axiom 3: If *A*1, *A*2, *A3*, … form a sequence of pairwise mutually exclusive events in *S* (that is, *Ai ∩ A*j = ∅ if *I* ≠ *j*), then

Def 2.9)

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

Provided *P(B) > 0.* [The symbol *P(A|B)* is read “probability of *A* given *B.”*]

Def 2.10)

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

*P(A|B)* = *P(A),*

*P(B|A)* = *P(B),*

*P(A ∩ B) = P(A)P(B).*

Otherwise, the events are said to be *dependent.*

Def 2.11)

For some positive integer *k,* let the sets *B*1, *B*2, …, *B*k be such that

1. *S* = *B1* ∪ *B2* ∪ … ∪ *B*k.
2. *Bi ∩ B*j = ∅, for i ≠ *j*.

Then the collection of sets (*B1, B2, …, Bk)* is said to be a *partition* of *S*.

Def 3.4)

Let *Y* be a discrete random variable with the probability function *p(y)*. Then the *expected value* of *Y*, *E(Y)* is defined to be:

Def 3.5)

If *Y*, is a random variable with mean *E(Y)* = µ, the variance of a random variable *Y* is defined to be the expected value of (*Y* - µ)2. That is,

The *standard deviation* of *Y* is the positive square root of *V(Y)*.

Def 3.7)

A random variable *Y* is said to have a *binomial distribution* based on *n* trials with success *p* if and only if

Def 3.8)

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