Fred Maul Formula Sheet –

**Standard Deviation Formula:**

**Use:** Used to find the deviation of the data values from the mean

**Variables:**

N – Number of Data points

Xi each of the data values

Xm - the mean of Xi

**Def 1.1:**

**Use:** To get the mean of a sample of n measure responses

**Variables:**

N – Measure of Responses

Y - Samples

Y bar – The sample mean

**Def 1.2:** Variance of a sample measurement

**Use:** Used to calculate the variance by taking the sum of the square of the differences between the measurement and the mean, divided by n- 1

**Variables:**

N – measure of response

Y – samples

Y bar – sample mean

**Def 1.3:** Standard Deviation

**Use:** Get the standard deviation by squaring the variance

**Variables:**

S – the variance

**Def 2.6:** Axioms 1, 2, and 3 in order.

**Use:**

Axiom 1 – No negative probability

Axiom 2 – The total probability of the sample space must equal 100 percent

Axiom 3 -

**Variables:**

P () – Probability

A – Event

S sample space

**Def 2.7 and Theorem 2.2:** Permutations - order matters

**Use:** To get the ordered arrangement of distinct objects

**Variables:**

R – taken at a time

N – distinct objects

**Theorem 2.3:** Determine the number of subsets of various sizes that can be formed

**Use:** To partition distinct objects into distinct groups.

**Variables:**

n – objects

k - groups

**Def 2.8 and THEOREM 2.4:** Combinations – order doesn’t matter

**Use:** Get unordered subsets

**Variables:**

r – the size chosen

n – available objects

**Def 2.9:** The conditional probability of an event. A, given that an event B has occurred, is equal to t

**Use:** Provided P(B) > 0 then the symbol P(A|B) is read “probability of A given B”

**Variables:**

P() Probability of

A – Event

B – event

**Def 2.10: If one of these is satisfied, the event is independent**

**Use: to determine 2 events are independent**

**Variables**:

P() – probability of

A – Event

B – event

**Theorem 2.5:** The probability of the intersection of two events A and B is

If A and B are independent events

**Use:** to determine the probability of two events intersecting

**Variable:**

P() – probability of

A – Event

B – event

**Theorem 2.6:** The probability of the union of two events A and B is

If A and B are mutually exclusive events

**Use:** Take two events and determine the probability of the union

**Variables:**

P() – probability of

A – Event

B – event

**Theorem 2.7:** If A is an event

**Use:** Calculate “NOT A” to solve A

**Variable:**

P() – probability of

A – Event

**Def 2.11**: For some positive integer K, let the sets B1,B2, … Bk be such that

Then the collection of the sets (B1, B2, BK) is said to be the partition of S

If A is a subset of S and B1, B2, BK) us a partition o S, A can be decomposed as follows

**Use:** Solve for the law of total probability

**Variables:**

S – sample space

B – sets

**Theorem 2.8:** Assume (B1, B2, B,K) is a partition of the set S (**From 2.11**) P(Bi) > 0, for I =1, 2, k Then for any set A

**Use:** To get the partition of S

**Variables:**

P() probability of

A – Event

B – partition of S

**Def 2.9:** Assume (B1, B2, B, K) is a partition of the set S (**From 2.11**) P(Bi) > 0, for I =1, 2, k Then for any set A

**Use:** From the result of 2.8, use Bayes' rule to determine P(A)

**Variables:**

P() probability of

A – Event

B – partition of S

**Def 3.2 and Def 3.3:** The probability that Y takes on the values y, P(Y= y) is the sum of the probability’s likelihood of all the sample points s that are assigned the value y

The probability distribution for a discrete variable Y can be represented

**Use**: get probability of distribution for a discrete random variable

**Variables**:

y – assigned probability

Y – random variable

**Theorem 3.1:**

Where the summation is over all values of y with nonzero probability

**Use:** Must be true for a discrete probability function.

**Variables:**

P() probability of

y – assigned probability

**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

**Use:** get expected value of Y

**Variables:**

E()- expected value

P() probability of

y – assigned probability

**Theorem 3.2:** Let Y be a discrete random variable with the probability function p(y) and g(Y) be a real valued function of Y. Then the expected value of g(Y) is given by

**Use:** get expected value of g(Y)

**Variables:**

E()- expected value

P() probability of

y – assigned probability

**Theorem 3.3 Use:** Let Y be a discrete random variable with probability function p(y) and c be a constant – nonrandom c is = c

**Theorem 3.4 Use –** The expected value of the product of a constant c times a function of a random variable is equal to the constant times the expected value of the function of the variable

**Theorem 3.5 Use –** the mean or expected value of a sum of functions of a random variable Y is equal to the sum of their respective expected values

**Theorem 3.6: Let Y be a discrete random variable with probability function p(y) and mean E(Y) = u**

**Def 3.7:** A random variable Y is said to have a binomial distribution based on t n trials with success probability p is and only if

**Def 3.8:** A random variable Y is said to have a geometric probability distribution if and only if