Ta'Quawn Watts

Formula Sheet

Definition 1.1: Mean

$$\bar{y} = \frac{1}{n}\sum_{i=1}^{n} y_i$$

Definition 1.2: Variance

$$s^2 = \frac{1}{n-1}\sum_{i=1}^{n} (y_i - \bar{y})^2$$

Definition 1.3: Standard Deviation

$$s = \sqrt{s^2}$$

Definition 2.6: Probability

$$P(A_1 \cup A_3 \cup A_3 \cup \dots) = \sum_{i=1}^{\infty} P(A_i)$$

Definition 2.7: Permutation

$$P_r^n = n(n-1)(n-2)\dots(n-r+1) = \frac{n!}{(n-r)!}$$

Definition 2.8: Combinations

$$\binom{n}{r} = C_r^n = \frac{P_r^n}{r!} = \frac{n!}{r!\,(n-r)!}$$

Definition 2.9: Conditional Probability

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

Definition 2.10: Independent Events

$$P(A|B) = P(A)$$
$$P(B|A) = P(B)$$
$$P(A \cap B) = P(A)P(B)$$

Theorem 2.5: Multiplicative Law of Probability

$$P(A \cap B) = P(A)P(B|A) = P(B)P(A|B)$$

Theorem 2.6: Additive Law of Probability

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

Theorem 2.7:

$$P(A) = 1 - P(\bar{A})$$

Theorem 2.8:

$$P(A) = \sum_{i=1}^{k} P(A|B_i)P(B_i)$$

Theorem 2.9: Bayes' Rule

$$P(B_j|A) = \frac{P(A|B_j)P(B_j)}{\sum_{i=1}^{k} P(A|B_i)P(B_i)}$$

Definition 3.3: Probability Mass Function

$$p(y) = P(Y = y)$$

Definition 3.7: Binomial Distribution

$$p(y) = \binom{n}{r} p^y q^{n-y}$$

Theorem 3.8: Geometric Distribution

$$\mu = E(Y) = \frac{1}{p}$$

$$\sigma^2 = V(Y) = \frac{1-p}{p^2}$$