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CSCI 3327 Formula Sheet

Sample Mean

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

Population Mean

$$\mu = \frac{1}{N}\sum_{i=1}^{N} y_i$$

Sample Variance

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

Population Variance

$$\sigma^2 = \frac{1}{N}\sum_{i=1}^{N}(y_i - \mu)^2$$

Sample Standard Deviation (From the book)

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

Sample Standard Deviation

$$s = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n - 1}}$$

Population Standard Deviation (From the book)

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

Population Standard Deviation

$$\sigma = \sqrt{\frac{\sum_{i=1}^{N}(x_i - \mu)^2}{N}}$$

Distributive Laws (Set Theory)

$$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$$
$$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$$

DeMorgan's Laws

$$\overline{(A \cap B)} = \bar{A} \cup \bar{B}$$
$$\overline{(A \cup B)} = \bar{A} \cap \bar{B}$$

mn Rule

$$mn = m \times n$$

Permutation Formula

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

Combination Formula

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

Multinomial Coefficient Formula

$$N = \frac{n!}{n_1!\,n_2!\cdots n_k!}$$

Conditional Probability

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

Independence Equations

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

Multiplicative Law of Probability (Dependent)

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

Multiplicative Law of Probability (Independent)

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

Additive Law of Probability

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

Mutually Exclusive Events, where $P(A \cap B) = 0$

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

Finding Probability of A when traditional methods are too difficult

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

The Law of Total Probability

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

Bayes' Rule

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