

## 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)

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

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

### 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

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

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

### Conditional Probability

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

### **Multiplicative Law of Probability (Dependent)**

$$\begin{aligned}P(A \cap B) &= P(A)P(B|A) \\ &= P(B)P(A|B)\end{aligned}$$

### **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  $P(A \cap B) = 0$

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

### **Permutation Formula**

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

### **Combination Formula**

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

### Multinomial Coefficient Formula

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

### mn Rule

$$mn = m \times n$$

### Independence Equations

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

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

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