Melody Abapo

Formula Sheet

Mean:

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

Variance:

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

Standard deviation:

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

Probability

$$P(A_1 \cup A_2 \cup A_3 \dots) = \sum_{i=1}^{\infty} P(A_i)$$

Permutation:

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

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

Combination:

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

Conditional probability:

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

Independence

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

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

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

Multiplicative law of probability

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

If A and B are independent, then

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

Additive law of probability:

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

Baye's rule:

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

Discrete Expected Value/Mean of Y. E(Y):

$$E(Y) = \sum_{y} yp(y)$$

Discrete Variance

$$V(Y) = E[(Y - \mu)^2]$$

Discrete standard deviation

$$\sqrt{V(Y)}$$

Binomial Distribution

$$p(y) = \binom{n}{y} p^y q^{n-y}, y = 1,2,3, \dots, n \; and \; 0 \leq p \leq 1$$

Geometric probability distribution

$$p(y) = q^{y-1}p, y = 1,2,3, \dots, 0 \leq p \leq 1$$