

TEST 1 FORMULAS:

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

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

$$P(E \cup F) = P(E) + P(F) - P(E \cap F)$$

$$P(E | F) = \frac{P(E \cap F)}{P(F)}$$

$$\mu_X = E[X] = x_1 p_1 + x_2 p_2 + \dots + x_n p_n$$

$$\begin{aligned} \sigma_X^2 &= Var[X] = (x_1 - \mu_X)^2 p_1 + (x_2 - \mu_X)^2 p_2 + \dots + (x_n - \mu_X)^2 p_n \\ &= \sum (x_i - \mu_X)^2 p_i \end{aligned}$$

$$\sigma_X^2 = Var[X] = E[X^2] - (E[X])^2$$

$$cv(x) = \frac{sd(x)}{\mu(x)}$$

$$cov(x, y) = \frac{1}{n} \sum_{i=1}^n (x_i - \mu(x))(y_i - \mu(y))$$

$$cor(x, y) = \frac{cov(x, y)}{sd(x) \cdot sd(y)}$$

Bayes' Thm:

$$P(A_j | B) = \frac{P(B | A_j) P(A_j)}{P(B)} = \frac{P(B | A_j) P(A_j)}{\sum_i P(B | A_i) P(A_i)}$$

*Binomial:*

$$P(X = k) = \binom{n}{k} p^k (1-p)^{n-k}$$

$$\mu = E[X] = np$$

$$\sigma^2 = np(1-p)$$