EXPECTATION FORMULAS

$$E(a \cdot X \pm b \cdot Y|B) = a \cdot E(X|B) \pm b \cdot E(Y|B)$$

$$E(X \cdot I_B|C) = E(X|B \ \& \ C) \cdot E(I_B|C)$$

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

$$E(X \cdot I_B) = E(X|B) \cdot P(B)$$

$$P(A \ or \ B) = P(A) + P(B) - P(A\&B)$$

$$P(A|B) \cdot P(B) = P(A\&B) = P(B\&A) = P(B|A) \cdot P(A)$$

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

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

$$Cov(X,Y) = E([X - \mu_X] \cdot [Y - \mu_Y])$$

$$Var(X) = Cov(X,X)$$

$$SD(X) = \sigma_X = \sqrt{Var(X)}$$

$$\rho = \rho(X,Y) = \frac{Cov(X,Y)}{\sigma_X \cdot \sigma_Y}$$

$$Cov(X,Y) = E(X \cdot Y) - \mu_X \cdot \mu_Y = \rho \cdot \sigma_X \cdot \sigma_Y$$

$$E(X \cdot Y) = \mu_X \cdot \mu_Y + Cov(X,Y)$$

$$Var(X \pm Y) = Var(X) + Var(Y) \pm 2Cov(X,Y)$$

$$\rho = Cov(Z_X, Z_Y) = E(Z_X \cdot Z_Y)$$

$$P(X = k) = C(n,k)p^k(1-p)^{n-k}$$

$$P(X = k) = C(R,k)C(N-R, n-k)/C(N,k)$$