Formula Sheet

$$\bar{X} = \frac{\sum X_i}{n}, \quad s^2 = \frac{\sum (X_i - \bar{X})^2}{n-1}$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$P(A|B) = P(A \text{ and } B)/P(B)$$

$$P(A \text{ and } B) = P(A|B)P(B); \quad P(A \text{ and } B) = P(A)P(B)$$

$$\mu = E(X) = \sum Xp(X)$$

$$\sigma^2 = \sum [(X-\mu)^2 p(X)] = \sum [X^2 p(X)] - \mu^2$$

$$p(X) = {}_nC_X p^X (1-p)^{n-X} = \frac{n!}{(n-X)!X!} p^X (1-p)^{n-X}$$

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

If $X \sim N(\mu, \sigma)$ then $z = (X-\mu)/\sigma$ is N(0, 1)

$$\bar{X} \sim N(\mu, \sigma/\sqrt{n}).$$

$$\bar{X} \pm z_{\alpha/2}\frac{\sigma}{\sqrt{n}}, \quad \bar{X} \pm t_{\alpha/2}\frac{s}{\sqrt{n}} \quad [(n-1) \text{ df}], \quad \hat{p} \pm z_{\alpha/2}\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

$$n = \left[\frac{z_{\alpha/2} \cdot \sigma}{E}\right]^2, \quad n = \hat{p}(1-\hat{p})\left[\frac{z_{\alpha/2}}{E}\right]^2$$

$$z = \frac{\bar{X}-\mu}{\sigma/\sqrt{n}}, \quad t = \frac{\bar{X}-\mu}{s/\sqrt{n}} \quad [(n-1) \text{ df}], \quad z = \frac{\hat{p}-p}{\sqrt{p(1-p)/n}}$$

$$z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}, \quad t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \quad [\min(n_1 - 1, n_2 - 1) \text{ df}]$$

$$(\bar{X}_1 - \bar{X}_2) \pm z_{\alpha/2}\sqrt{\sigma_1^2/n_1 + \sigma_2^2/n_2}, \quad (\bar{X}_1 - \bar{X}_2) \pm t_{\alpha/2}\sqrt{s_1^2/n_1 + s_2^2/n_2}$$

$$t = \frac{\bar{D}}{s_D/\sqrt{n_D}}$$

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}, \quad E_i = np_{i,o}, \quad (k-1) \text{ df}$$

$$SS_{yy} = \sum y^2 - \frac{(\sum y)^2}{n}, \quad SS_{xy} = \sum xy - \frac{(\sum x)(\sum y)}{n}, \quad SS_{xx} = \sum x^2 - \frac{(\sum x)^2}{n}$$

$$r = \frac{SS_{xy}}{\sqrt{SS_{xx}SS_{yy}}}, \quad b = \frac{SS_{xy}}{SS_{xx}}, \quad a = \bar{y} - b\bar{x}$$