Formulas for Math 251

$$SS_x = \sum(x-\bar{x})^2 = \sum x^2 - \frac{(\sum x)^2}{n} \qquad s^2 = \frac{SS_x}{n-1}$$

$$SS_x = \sum(x-\mu)^2 = \sum x^2 - \frac{(\sum x)^2}{N} \qquad \sigma^2 = \frac{SS_x}{N}$$

$$C_{n,r} = \frac{n!}{(n-r)!r!} \qquad P_{n,r} = \frac{n!}{(n-r)!}$$

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

$$\mu = E(x) = \sum xp(x) \qquad \sigma^2 = \sum(x-\mu)^2 p(x) = \left(\sum x^2 p(x)\right) - \mu^2$$

$$p(r) = C_{n,r}p^r q^{n-r} \quad \mu = np \quad \sigma^2 = npq$$

$$W = ax_1 + bx_2, \quad \mu_W = a\mu_{x_1} + b\mu_{x_2}, \quad \sigma_W^2 = a^2\sigma_{x_1}^2 + b^2\sigma_{x_2}^2$$

$$L = ax + b, \quad \mu_L = a\mu_x + b, \quad \sigma_W^2 = a^2\sigma_x^2$$

$$\mu_{\bar{x}} = \mu \quad \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} \quad \sigma_{\bar{x}_1-\bar{x}_2} = \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}} \qquad \sigma_{\hat{p}_1-\hat{p}_2} = \sqrt{\frac{p_1q_1}{n_1} + \frac{p_2q_2}{n_2}}$$

$$\hat{p} = \frac{x}{n} \quad \mu_{\hat{p}} = p \quad \sigma_{\hat{p}} = \sqrt{\frac{pq}{n}}$$

$$\bar{x} \pm z_c\sigma_{\bar{x}} \qquad \bar{x} \pm t_c\frac{s}{\sqrt{n}} \qquad \hat{p} \pm z_c\sigma_{\hat{p}} \qquad \hat{p}_2 - \hat{p}_2 \pm z_c\sigma_{\hat{p}_1-\hat{p}_2} \qquad \bar{x}_1 - \bar{x}_2 \pm z_c\sigma_{\bar{x}_1-\bar{x}_2}$$

$$n = \left(\frac{z_c\sigma}{E}\right)^2 \qquad n = pq\left(\frac{z_c}{E}\right)^2 \qquad n = \frac{1}{4}\left(\frac{z_c}{E}\right)^2$$

$$t = \frac{\bar{x}-\mu}{\frac{s}{\sqrt{n}}} \qquad z = \frac{x-\mu}{\sigma} \qquad z = \frac{\bar{x}-\mu}{\sigma_{\bar{x}}} \qquad z = \frac{\hat{p}-p}{\sigma_{\hat{p}}}$$

$$z = \frac{(\bar{x}_1-\bar{x}_2)-(\mu_1-\mu_2)}{\sigma_{\bar{x}_1-\bar{x}_2}} \qquad z = \frac{(\hat{p}_1-\hat{p}_2)-(p_1-p_2)}{\sigma_{\hat{p}_1-\hat{p}_2}}$$

$$SS_x = \sum x^2 - \frac{(\sum x)^2}{n} \qquad SS_y = \sum y^2 - \frac{(\sum y)^2}{n} \qquad SS_{xy} = \sum xy - \frac{(\sum x)(\sum y)}{n}$$

$$y = a + bx, \qquad b = \frac{SS_{xy}}{SS_x} \qquad a = \bar{y} - b\bar{x} \qquad r = \frac{S_{xy}}{\sqrt{SS_x \cdot SS_y}}$$

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

$$F = \frac{MS_{BET}}{MS_W} \qquad d.f._{BET} = k-1 \qquad d.f._W = N-k$$