STAT-319 Formula Sheet for Second Major Exam Term 143

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

$$X \sim N(\mu, \sigma^2) \Rightarrow Z = \frac{X-\mu}{\sigma} \sim N(0,1); \; \bar{X} \sim N(\mu, \sigma^2/n) \Rightarrow Z = \frac{\bar{X}-\mu}{\sigma/\sqrt{n}} \sim N(0,1)$$

$$\mu_{\bar{X}} = \mu, \; \sigma_{\bar{X}} = \frac{\sigma}{\sqrt{n}}, \; \mu_{\bar{X}_1 - \bar{X}_2} = \mu_1 - \mu_2, \; \sigma^2_{\bar{X}_1 - \bar{X}_2} = \frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}$$

$$\bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}}; \; \bar{x} \pm t_{\alpha/2,v} \frac{s}{\sqrt{n}} \text{ where } v = n-1; \; \bar{x} \pm z_{\alpha/2} \frac{s}{\sqrt{n}}; \; n \geq \left(\frac{Z_{\alpha/2}\sigma}{e}\right)^2$$

$$\hat{p} \pm z_{\alpha/2} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}; \quad n \geq \frac{Z^2_{\alpha/2}\hat{p}(1-\hat{p})}{e^2}$$

$$(\bar{x}_1 - \bar{x}_2) \pm z_{\alpha/2} \sqrt{\frac{\sigma_{1_0}^{\;2}}{n_1} + \frac{\sigma_{2_0}^{\;2}}{n_2}}; \quad (\bar{x}_1 - \bar{x}_2) \pm z_{\alpha/2}\, \sigma_0 \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

$$(\bar{x}_1 - \bar{x}_2) \pm t_{\frac{\alpha}{2},v}\, s_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}, \text{ Where } s_p = \sqrt{\frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1+n_2-2}} \text{ and } v = n_1 + n_2 - 2$$

$$(\bar{x}_1 - \bar{x}_2) \pm t_{\frac{\alpha}{2},v} \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} \text{ Where } v = \left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2 \Bigg/ \left(\frac{(s_1^2/n_1)^2}{n_1-1} + \frac{(s_2^2/n_2)^2}{n_2-1}\right)$$

$$(\bar{x}_1 - \bar{x}_2) \pm z_{\alpha/2} \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

$$(\hat{p}_1 - \hat{p}_2) \pm z_{\alpha/2} \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$$

$$\mu = E(X) = \sum x f(x); \quad E(X^2) = \sum x^2 f(x) \quad \text{and} \quad \sigma^2 = E(X-\mu)^2 = E(X^2) - \mu^2$$

$$f(x) = \frac{1}{n}; \; x = x_1, x_2, \ldots, x_n; \; \mu = \frac{x_n + x_1}{2}; \; \sigma^2 = \frac{(x_n - x_1 + 1)^2 - 1}{12} \text{ (for consecutive integers from } x_1 \text{ to } x_n)$$

$$f(x) = \binom{n}{x} p^x (1-p)^{n-x}; \; x = 0,1,\ldots,n; \; \mu = np; \; \sigma^2 = np(1-p)$$

$$\mu = E(X) = \int_{-\infty}^{\infty} x f(x)\,dx; \quad E(X^2) = \int_{-\infty}^{\infty} x^2 f(x)\,dx \quad \text{and} \quad \sigma^2 = E(X-\mu)^2 = E(X^2) - \mu^2$$