Formula Sheet – Test 2 – STAT 515

$$\mu = \sum xP(x),\ \sigma^2 = \left[\sum x^2 P(x)\right] - \mu^2$$

For $X \sim$ Binomial(n,p):

$$P(x) = \frac{n!}{x!(n-x)!}p^x q^{n-x},\ \mu = np,\ \sigma^2 = npq$$

For $X \sim$ Uniform(c,d):

$$P(a < X < b) = \frac{b-a}{d-c},\ \mu = \frac{c+d}{2},\ \sigma = \frac{d-c}{\sqrt{12}}$$

$$Z = \frac{X-\mu}{\sigma},\ X = Z\sigma + \mu$$

$$Z = \frac{\bar{X}-\mu}{\sigma/\sqrt{n}}$$

$$\bar{x} \pm t_{\alpha/2}(s/\sqrt{n}),$$

where $t_{\alpha/2}$ based on $n-1$ df

Classical CI for p:

$$\hat{p} \pm z_{\alpha/2}\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

Agresti-Coull CI for p:

$$p^* \pm z_{\alpha/2}\sqrt{\frac{p^*(1-p^*)}{n+4}}$$

where $p^* = \frac{x+2}{n+4}$.

$$\left(\frac{(n-1)s^2}{\chi^2_{\alpha/2}},\ \frac{(n-1)s^2}{\chi^2_{1-\alpha/2}}\right)$$

$$\left(\frac{s_1^2/s_2^2}{F_{\alpha/2(n_1-1,n_2-1)}},\ \frac{s_1^2/s_2^2}{1/F_{\alpha/2(n_2-1,n_1-1)}}\right)$$

Sample size formulas:

$$n = \frac{(z_{\alpha/2})^2\sigma^2}{B^2},\ n = \frac{(z_{\alpha/2})^2 pq}{B^2}$$