Formula Sheet

$$\overline{x} = \frac{\sum x}{n} = \frac{\sum xf}{n}$$

$$SS(x) = \sum (x-\overline{x})^2 = \sum x^2 - n(\overline{x})^2 = \sum x^2 - \frac{(\sum x)^2}{n} = \sum x^2 f - \frac{(\sum xf)^2}{n}$$

$$\sigma^2 = \frac{SS(x)}{n}$$

$$s^2 = \frac{SS(x)}{n-1}$$

$$\mu = E(X) = \sum xP(x)$$

$$\sigma^2 = Var(X) = \sum (x-\mu)^2 P(x) = \sum x^2 P(x) - \mu^2$$

$$\mu = E(X) = \int_{-\infty}^{\infty} xf(x)\,dx$$

$$\sigma^2 = Var(X) = \int_{-\infty}^{\infty} (x-\mu)^2 f(x)\,dx = \int_{-\infty}^{\infty} x^2 f(x)\,dx - \mu^2$$

$$P(X=x) = \binom{n}{x} p^x (1-p)^{n-x}$$

$$\mu = np$$

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

$$P(X=x) = \frac{\mu^x e^{-\mu}}{x!}$$

$$\sigma^2 = \mu$$

$$P(X=x) = \frac{\binom{M}{x}\binom{N-M}{n-x}}{\binom{N}{n}}$$

$$\mu = n\frac{M}{N}$$

$$\sigma^2 = \frac{N-n}{N-1} n \frac{M}{N} \frac{N-M}{N}$$

$$P(a \le X \le b) = \int_a^b \frac{e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}}{\sigma\sqrt{2\pi}}\,dx$$

$$\mu_{\overline{x}} = \mu$$

$$\sigma_{\overline{x}} = SE = \frac{\sigma_x}{\sqrt{n}}$$

$$\mu_{\overline{d}} = \mu_d = \overline{x_1} - \overline{x_2}$$

$$\sigma_{\overline{d}} = \frac{\sigma_d}{\sqrt{n}}$$

$$\mu_{\overline{x_1}-\overline{x_2}} = \mu_{x_1} - \mu_{x_2}$$

$$\sigma_{\overline{x_1}-\overline{x_2}} = SE = \sqrt{\frac{{\sigma_1}^2}{n_1} + \frac{{\sigma_2}^2}{n_2}}$$

$$df = \frac{\left(\frac{{s_1}^2}{n_1} + \frac{{s_2}^2}{n_2}\right)^2}{\frac{{s_1}^4}{{n_1}^2(n_1-1)} + \frac{{s_2}^4}{{n_2}^2(n_2-1)}}$$

$$\mu_{\hat{p}} = p$$

$$\sigma_{\hat{p}} = \sqrt{\frac{p(1-p)}{n}}$$

$$\mu_{\hat{p}_1-\hat{p}_2} = p_1 - p_2$$

$$\sigma_{\hat{p}_1-\hat{p}_2} = SE = \sqrt{\frac{p_1(1-p_1)}{n_1} + \frac{p_2(1-p_2)}{n_2}}$$

$$\hat{p} = \frac{x_1+x_2}{n_1+n_2}$$

$$\sigma_{\hat{p}_1-\hat{p}_2} = SE \approx \sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$$

$$\chi^2 = \sum \frac{(f_i - e_i)^2}{e_i}$$

$$SS(xy) = \sum (x-\overline{x})(y-\overline{y}) = \sum xy - \frac{(\sum x)(\sum y)}{n}$$

$$SSE = \sum (y-\hat{y})^2$$

$$b_1 = \frac{SS(xy)}{SS(x)} = \frac{\sum (x-\overline{x})(y-\overline{y})}{\sum (x-\overline{x})^2}$$

$$b_0 = \frac{\sum y - (b_1 \cdot \sum x)}{n} = \overline{y} - (b_1 \cdot \overline{x})$$

$$r = \frac{SS(xy)}{\sqrt{SS(x)SS(y)}}$$