

Formula Sheet

$$\begin{aligned}\bar{x} &= \frac{\sum x}{n} \\ &= \frac{\sum xf}{n}\end{aligned}$$

$$\begin{aligned}SS(x) &= \sum (x - \bar{x})^2 \\ &= \sum x^2 - n(\bar{x})^2 \\ &= \sum x^2 - \frac{(\sum x)^2}{n} \\ &= \sum x^2 f - \frac{(\sum xf)^2}{n}\end{aligned}$$

$$\begin{aligned}\sigma^2 &= \frac{SS(x)}{n} \\ s^2 &= \frac{SS(x)}{n-1}\end{aligned}$$

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

$$\begin{aligned}\sigma^2 = Var(X) &= \sum (x - \mu)^2 P(x) \\ &= \sum x^2 P(x) - \mu^2\end{aligned}$$

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

$$\begin{aligned}\sigma^2 = Var(X) &= \int_{-\infty}^{\infty} (x - \mu)^2 f(x) dx \\ &= \int_{-\infty}^{\infty} x^2 f(x) dx - \mu^2\end{aligned}$$

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

$$\mu = np$$

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

$$\begin{aligned}P(X = x) &= \frac{\mu^x e^{-\mu}}{x!} \\ \sigma^2 &= \mu\end{aligned}$$

$$\begin{aligned}P(X = x) &= \frac{\binom{M}{x} \binom{N-M}{n-x}}{\binom{N}{n}} \\ \mu &= n \frac{M}{N} \\ \sigma^2 &= \frac{N-n}{N-1} n \frac{M}{N} \frac{N-M}{N}\end{aligned}$$

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

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

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

$$\mu_{\bar{d}} = \mu_d = \bar{x}_1 - \bar{x}_2$$

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

$$\mu_{\bar{x}_1 - \bar{x}_2} = \mu_{x_1} - \mu_{x_2}$$

$$\sigma_{\bar{x}_1 - \bar{x}_2} = SE = \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$$

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

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

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

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

$$\sigma_{\hat{p}_1 - \hat{p}_2} = SE$$

$$= \sqrt{\frac{p_1(1-p_1)}{n_1} + \frac{p_2(1-p_2)}{n_2}}$$

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

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

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

$$\begin{aligned}SS(xy) &= \sum (x - \bar{x})(y - \bar{y}) \\ &= \sum xy - \frac{(\sum x)(\sum y)}{n}\end{aligned}$$

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

$$b_1 = \frac{SS(xy)}{SS(x)}$$

$$= \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$

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

$$= \bar{y} - (b_1 \cdot \bar{x})$$

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