MATHEMATICS 360-255-LW
Quantitative Methods II
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Formula Sheet

$P_r^n = \dfrac{n!}{(n-r)!}$ $\qquad \dfrac{n!}{p!q!\cdots r!}$ $\qquad C_r^n = \dfrac{n!}{r!(n-r)!}$

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

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

$P(A \mid B) = \dfrac{P(A \text{ and } B)}{P(B)}$

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

$P(r) = C_r^n p^r q^{n-r}$ $\qquad \mu = np$ $\qquad \sigma = \sqrt{npq}$

$P(k) = \dfrac{\mu^k e^{-\mu}}{k!}$

$z = \dfrac{x-\mu}{\sigma}$ $\qquad x = \mu + z\sigma$

$B(n,p) \sim N(\mu, \sigma^2)$ if $np > 5$ and $nq > 5$

$\mu_{\bar{x}} = \mu$ $\qquad \mu_{\hat{p}} = p$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$ $\qquad \sigma_{\hat{p}} = \sqrt{\frac{pq}{n}}$

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

$E = z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$ $\qquad E = t_{\left(df, \frac{\alpha}{2}\right)} \frac{s}{\sqrt{n}}$ $\qquad E = z_{\frac{\alpha}{2}} \sqrt{\frac{\hat{p}\hat{q}}{n}}$

$\bar{x} - E < \mu < \bar{x} + E$ $\qquad \hat{p} - E < p < \hat{p} + E$

$n = \left(\dfrac{z_{\frac{\alpha}{2}}\sigma}{E}\right)^2$ $\qquad n = \dfrac{z_{\frac{\alpha}{2}}^2 pq}{E^2}$ $\qquad n = \dfrac{z_{\frac{\alpha}{2}}^2}{4E^2}$

$$t = \frac{\overline{d} - \mu_d}{\frac{s_d}{\sqrt{n}}} \quad \text{with } df = n - 1 \qquad E = t_{\left(df, \frac{\alpha}{2}\right)} \frac{s_d}{\sqrt{n}}$$

$$z = \frac{\overline{d} - \mu_d}{\frac{s_d}{\sqrt{n}}} \qquad E = z_{\frac{\alpha}{2}} \frac{s_d}{\sqrt{n}}$$

$$z = \frac{\left(\overline{x}_1 - \overline{x}_2\right) - \left(\mu_1 - \mu_2\right)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}} \qquad E = z_{\frac{\alpha}{2}} \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$$

$$t = \frac{\left(\overline{x}_1 - \overline{x}_2\right) - \left(\mu_1 - \mu_2\right)}{s_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \quad \text{with } df = n_1 + n_2 - 2 \qquad E = t_{\left(df, \frac{\alpha}{2}\right)} s_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

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

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}_p \hat{q}_p \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \qquad \hat{p}_p = \frac{r_1 + r_2}{n_1 + n_2} \qquad E = z_{\frac{\alpha}{2}} \sqrt{\frac{\hat{p}_1 \hat{q}_1}{n_1} + \frac{\hat{p}_2 \hat{q}_2}{n_2}}$$

$$\chi^2 = \sum \frac{\left(O - E\right)^2}{E} \qquad E = \frac{\left(\text{row total}\right) \times \left(\text{column total}\right)}{\text{grand total}} \qquad df = \left(R - 1\right)\left(C - 1\right)$$

$$df = n - 1$$

$$\chi^2 = \frac{\left(n - 1\right) s^2}{\sigma^2} \quad \text{with } df = n - 1 \qquad \frac{\left(n - 1\right) s^2}{\chi^2_{\left(df, \frac{\alpha}{2}\right)}} < \sigma^2 < \frac{\left(n - 1\right) s^2}{\chi^2_{\left(df, 1 - \frac{\alpha}{2}\right)}}$$

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

$$t = \frac{r\sqrt{n - 2}}{\sqrt{1 - r^2}} \quad \text{with } df = n - 2$$

$$Z = \frac{1}{2} \ln \frac{1 + r}{1 - r} \qquad Z - \frac{z_{\frac{\alpha}{2}}}{\sqrt{n - 3}} < \mu_z < Z + \frac{z_{\frac{\alpha}{2}}}{\sqrt{n - 3}} \qquad r = \frac{e^{2Z} - 1}{e^{2Z} + 1}$$