

習題 7. * P 為該校學生兼差比例

(1) P 之 100(1-α)% 信賴區間為 $\hat{p} \pm Z_{\frac{\alpha}{2}} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$

估計 P 之點估計為 $\hat{p} = \frac{45}{80} = 0.56$

(2) P 之 100(1-α)% 誤差界限為 $Z_{\frac{\alpha}{2}} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$

P 之 95% 誤差界限為

$$Z_{\frac{\alpha}{2}} = Z_{0.025} = 1.96 \times 0.06 = 0.1176$$

(3) P 之 90% 信賴區間為

$$\hat{p} \pm Z_{\frac{\alpha}{2}} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = 0.56 \pm Z_{0.05} \sqrt{\frac{0.56 \times 0.44}{80}} = 0.56 \pm 1.645 \times 0.06 = 0.56 \pm 0.10$$

即 (0.46, 0.66)

習題 8. $P_1 \rightarrow$ 另搭捷運比例

$P_2 \rightarrow$ 女 =

$P_1 - P_2$ 之 100(1-α)% 信賴區間為

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

$$\hat{p}_1 = \frac{55}{100} = 0.55, \hat{p}_2 = \frac{60}{100} = 0.60$$

$\therefore P_1 - P_2$ 之 95% 信賴區間為

$$(\hat{p}_1 - \hat{p}_2) \pm Z_{\frac{\alpha}{2}} \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} = (0.55 - 0.60) \pm Z_{0.025} \sqrt{\frac{0.55 \times 0.45}{100} + \frac{0.60 \times 0.40}{100}} = (-0.05) \pm 1.96 \times 0.07$$

$$= (-0.05) \pm 0.14 \quad \text{即 } (-0.19, 0.09)$$

習題 2 $e = \frac{\sigma}{\sqrt{n}} \times Z_{\frac{\alpha}{2}}$

(1) $\sigma = 3, e = 0.5, 1 - \alpha = 0.95$

$$n = \left(\frac{3}{0.5}\right)^2 \times 1.96^2 = 138.3 \approx 139$$

(2) $\sigma = 0.2, e = 0.03, 1 - \alpha = 0.9$

$$n = \left(\frac{0.2}{0.03}\right)^2 \times 1.645^2 = 120.27 \approx 121$$

(3) $\sigma = 0.05, e = 0.02, 1 - \alpha = 0.98$

$$n = \left(\frac{0.05}{0.02}\right)^2 \times 2.326^2 = 33.8 \approx 34$$

習題 21

(1) $\hat{p} = \frac{105}{250} = 0.42, 1 - \alpha = 0.90, Z_{\frac{\alpha}{2}} = Z_{0.05} = 1.645$

$\therefore P$ 之 90% 信賴區間為

$$0.42 \pm Z_{0.05} \sqrt{\frac{0.42 \times 0.58}{250}} = 0.42 \pm 1.645 \times 0.03 = 0.42 \pm 0.05$$

即取 (0.37, 0.47)

$$\text{樣本數} = n = \left(\frac{Z_{\frac{\alpha}{2}}}{e}\right)^2 \times \hat{p}(1-\hat{p})$$

(2) $e = 0.03, 1 - \alpha = 0.95, Z_{\frac{\alpha}{2}} = Z_{0.025} = 1.96$

(a) $P = 0.3$

$$\therefore n = \left(\frac{1.96}{0.03}\right)^2 (0.3)(0.7) = 896.37 \approx 897$$

即取 $n = 897$

(b) $\hat{p} = \frac{105}{250} = 0.42$

$$\therefore n = \left(\frac{1.96}{0.03}\right)^2 (0.42)(0.58) = 1039.79 \approx 1040$$

即取 $n = 1040$

(c) $P = 0.5$

$$\therefore n = \left(\frac{1.96}{0.03}\right)^2 (0.5)(0.5) = 1067.11 \approx 1068$$

即取 $n = 1068$

本章習題

1. 請利用 t 分配、 χ^2 分配與 F 分配表，回答下列各小題：

(1) $t_{0.025}(10) = ?$ 2.228

(2) $t_{0.95}(8) = ?$ -1.860

(3) $\chi^2_{0.05}(12) = ?$ 21.03

(4) $\chi^2_{\alpha}(15) = 7.26$ ，求 $\alpha = ?$ 0.95

(5) $\chi^2_{0.95}(10) = ?$ 3.94

(6) $F_{0.05}(5, 8) = ?$ 3.69

(7) $F_{0.95}(6, 7) = ?$ $\frac{1}{4.21}$

(8) $F_{\alpha}(6, 6) = 4.28$ ，求 $\alpha = ?$ 0.05