

$$21. (1) \hat{p} = \frac{1.5}{2.5} = 0.42 \quad 0.42 \pm z_{0.05} \sqrt{\frac{0.42 \times 0.58}{2.5}}$$

$$= 0.42 \pm 1.645 \times 0.03$$

$$= 0.42 \pm 0.05 \Rightarrow (0.37, 0.47)$$

$$(2) (a) \hat{p} = 0.3, e = 0.03, 1 - \alpha = 0.95$$

$$e = \frac{z}{\sqrt{n}} \times z \quad n = \left(\frac{z}{e}\right)^2 \times \hat{p} \times (1 - \hat{p})$$

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

$$(b) \hat{p} = 0.42 \quad n = \left(\frac{1.96}{0.03}\right)^2 \times 0.42 \times 0.58 = 1039.79$$

$$\div 1040$$

$$(c) \hat{p} = 0.5 \quad n = \left(\frac{1.96}{0.03}\right)^2 \times 0.5 \times 0.5 = 1067.11 \div 1068$$

$$2. e = \frac{\sigma}{\sqrt{n}} \times \frac{z_{\alpha}}{2}$$

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

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

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

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

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

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

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

$$(2) t_{0.95}(8) = 1.86$$

$$(3) \chi^2_{0.15}(12) = 21.026$$

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

$$\alpha = 0.95$$

$$(5) \chi^2_{0.95}(12) = 3.940$$

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

$$(7) F_{0.95}(6, 9) = F_{0.05}(9, 6) = \frac{1}{4.2} = 0.238$$

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

$$7. (1) \hat{p} = \frac{45}{80} = 0.56$$

$$(2) z \frac{\sqrt{\hat{p}(1-\hat{p})}}{\sqrt{n}} = z_{0.025} \sqrt{\frac{0.56 \times 0.44}{80}} = 1.96 \times 0.06 = 0.12$$

$$(3) \hat{p} \pm z \frac{\sqrt{\hat{p}(1-\hat{p})}}{\sqrt{n}} = 0.56 \pm 0.06 \sqrt{\frac{0.56 \times 0.44}{80}} = 0.56 \pm 1.645 \times 0.06$$

$$= 0.56 \pm 0.1 \Rightarrow (0.46, 0.66)$$

$$8. \hat{p}_1 = 0.55 \quad \hat{p}_2 = 0.6$$

$$(\hat{p}_1 - \hat{p}_2) \pm z \frac{\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}}{\sqrt{n_1 + n_2}} = (0.55 - 0.6) \pm z_{0.025} \sqrt{\frac{0.55 \times 0.45}{100} + \frac{0.6 \times 0.4}{100}}$$

$$= -0.05 \pm 1.96 \times 0.07$$

$$= -0.05 \pm 0.14$$

$$[-0.19, 0.09]$$