

7.

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

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

$$(3) \hat{p} \pm z \frac{\sqrt{\hat{p}(1-\hat{p})}}{\sqrt{n}} = 0.56 \pm z_{0.05} \sqrt{\frac{0.56 \times 0.44}{80}} \\ = 0.56 \pm 0.1 \rightarrow (0.46, 0.66)$$

8.

$$\hat{p}_1 = \frac{55}{100} = 0.55, \hat{p}_2 = \frac{60}{100} = 0.6$$

$$(\hat{p}_1 - \hat{p}_2) \pm z \frac{\sqrt{\hat{p}_1(1-\hat{p}_1) + \hat{p}_2(1-\hat{p}_2)}}{\sqrt{n_1}} = (0.55 - 0.6) \pm z_{0.025} \sqrt{\frac{0.55 \times 0.45}{100} + \frac{0.6 \times 0.4}{100}} \\ = -0.05 \pm 0.14 \\ \Rightarrow (-0.19, 0.09)$$

21.

$$(1) \hat{p} = \frac{105}{250} = 0.42, 1-\alpha = 0.9 \quad z \frac{\alpha}{2} = z_{0.05} = 1.645$$

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

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

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

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

$$c. p = 0.5$$

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