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

(2) $z\frac{\alpha}{2}\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = z_{0.025}\sqrt{\frac{0.56\times0.44}{80}} = 1.96 \times 0.06 = 0.12$

(3) $\hat{p} \pm z\frac{\alpha}{2}\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = 0.56 \pm z_{0.05}\sqrt{\frac{0.56\times0.44}{80}}$

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

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

$(\hat{p}_1 - \hat{p}_2) \pm z\frac{\alpha}{2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_1}} = (0.55-0.6) \pm$

$z_{0.025}\sqrt{\frac{0.55\times0.45}{100} + \frac{0.6\times0.4}{100}} = -0.05 \pm 0.14$

$\rightarrow (-0.19, 0.09)$

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

$0.42 \pm z_{0.05}\sqrt{\frac{0.42\times0.58}{250}} = 0.45 \pm 0.05 \rightarrow (0.37, 0.47)$

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

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

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

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

C. $p = 0.5$

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