1. (i) $E = 0.03 \quad \alpha = 0.05$

$$n = 0.25 \left(\frac{Z_{\alpha}}{E}\right)^2$$

$$P(Z \leq z) = 0.05$$

$$P(Z \leq 1.96) = 0.05$$

$$n = 0.25 \left(\frac{1.96}{0.03}\right)^2$$

$$= 0.25 \cdot 65.33^2$$

$$= 0.25 \cdot 4268.44$$

$$= 1067.11$$

$$n = 1067$$

(ii) $\hat{p} = 0.70 \quad E = 0.03 \quad \alpha = 0.05$

$$n = pq \left(\frac{Z_{\alpha/2}}{E}\right)^2$$

$$= 0.70 \cdot 0.30 \left(\frac{1.96}{0.03}\right)^2$$

$$= 0.21 \cdot 4268.44$$

$$= 896.37$$

$$= 896$$

2) $n = 120$ not large = 88

treat large = 120 − 88 = 32

$\hat{p} = \frac{32}{120} = 0.2667$

(i) $se(\hat{p}) = \sqrt{\frac{pq}{n}} = \sqrt{\frac{0.7667 \cdot 0.7333}{120}}$

$se(\hat{p}) = 0.0404$

(ii) $Z_{0.1} = 1.645$

90% $(\hat{p} \pm Z_{0.1} \cdot se(\hat{p}))$

$(0.2667 \pm 1.645 \cdot 0.0404)$

(0.2667 ± 0.0665)

$(0.2002, 0.3332)$

(iii) $Z_{0.05} = 1.96$

95%

$(0.2667 \pm 1.96 \cdot 0.0404)$

(0.2667 ± 0.0792)

$(0.1875, 0.3459)$

The width of the 95% CI would be bigger