#1 a)

$$ME = 1.96 \cdot \sqrt{\frac{pq}{n}}$$ (since margin of error = 0.02)

($\alpha = 0.05$, $Z_{\frac{\alpha}{2}} = 1.96$)

$$0.02 = 1.96 \cdot \sqrt{\frac{0.4(0.6)}{n}}$$

$$\left(\frac{0.02}{1.96}\right)^2 = \frac{0.4(0.6)}{n}$$

$$n = \frac{0.4(0.6)}{\left(\frac{0.02}{1.96}\right)^2} \approx 2305$$

Therefore, the minimum sample size necessary to satisfy her goal is 2305.

b) If the prior information is not available, $p = 0.5$ to be conservati

$$ME = 1.96 \cdot \sqrt{\frac{pq}{n}}$$

$$0.02 = 1.96 \cdot \sqrt{\frac{0.5(1-0.5)}{n}}$$

$$\left(\frac{0.02}{1.96}\right)^2 = \frac{0.25}{n}$$

$$n \approx 2401$$

Therefore, the minimum sample size would be 2401.