

Assignment 2:

1. (a) $N=4400$ $\hat{\pi}=0.2$ $L=0.03$ $\frac{19}{20} = 0.95 \rightarrow c=1.96$

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$$n = \left(\frac{1}{N} + \frac{L^2}{c^2 \hat{\pi}^2} \right)^{-1}$$

$$= \left(\frac{1}{4400} + \frac{0.03^2}{1.96^2 \cdot 0.2(1-0.2)} \right)^{-1}$$

$= 592$ is the required sample size

(b) $L=0.04$, since no information about proportion of students, we pick up $\hat{\pi}=0.5$

$$n = \left(\frac{1}{N} + \frac{L^2}{c^2 \hat{\pi}^2} \right)^{-1}$$

$$= \left(\frac{1}{4400} + \frac{0.04^2}{1.96^2 \times 0.25} \right)^{-1}$$

$$= 528$$

(c) $\hat{\pi}=0.25$ $\hat{\pi}^2=0.25(1-0.25)$

$$\frac{1}{n} = \frac{1}{N} + \frac{L^2}{c^2 \hat{\pi}^2}$$

$$L^2 = c^2 \hat{\pi}^2 \left(\frac{1}{n} - \frac{1}{N} \right)$$

$$L^2 = 1.96^2 \cdot 0.25(1-0.25) \left(\frac{1}{528} - \frac{1}{4400} \right)$$

$$L^2 = ~~43218~~ 0.0012$$

$$L = 0.0346$$

(d) $0.0346 \neq 0.04$

They are not same because ~~we pick~~ we pick the maximum $\hat{\pi}=0.5$, thus make the L is also the largest which is 0.04 , so the L we get in (c) is $0.0346 < 0.04$.