

TOPIC 13 EXAMPLE

13-14 $\hat{p} = .15$ $n = ?$

a) $\sigma_{\hat{p}} = \frac{\sqrt{\pi(1-\pi)}}{n}$

b) Empirical rule states 95% of data is within 2 standard deviations. If .10 and .20 represent 2 standard deviations below and above the mean then a S.D. ^{standard deviation} is .025 (since $2x = .15 - .10 = .05 \Rightarrow x = .025$)

so $\sigma_{\hat{p}} = .025 = \frac{\sqrt{\pi(1-\pi)}}{n}$

~~XXXXXXXXXX~~ $\pi = .15$

$$\sqrt{n} = \frac{\sqrt{.15(.85)}}{.025} = \frac{\sqrt{.1275}}{.025}$$

square both sides: $n = \frac{.1275}{(.025)^2} = 204$

c) same as b)

but $2x = .15 - .13 = .02$ $x = .01$ where x is stand. dev.

$$\sigma_{\hat{p}} = .01 = \frac{\sqrt{\pi(1-\pi)}}{n}$$

$$\sqrt{n} = \frac{\sqrt{\pi(1-\pi)}}{.01} = \frac{\sqrt{.15(.85)}}{.01}$$

$$n = \frac{.1275}{(.01)^2} = \frac{.1275}{.0001} = 1275$$

Notice that a smaller interval, or S.D. width, requires a larger sample.