The pew research poll described in exercise 1 found that 49% of a sample of 799 teens admitted to misrepresenting their age online to access websites and online services. (treat this as a random sample)

a) Find the margin of error for this poll if we want 95% confidence in our estimate of the percent of American teens who have misrepresented their age online

b) Explain what that margin of error means

c) If we only need to be 90% confident, will the margin of error be larger or smaller? Explain

d) Find that margin of error

e) In general if all other aspects of the situation remain the same would smaller samples produce smaller or larger margin of error?

Solution

a)

$$E = z^* \sqrt{\frac{p(1-p)}{n}},$$

where $z^* = 1.96$ for 95% confidence level.

$$E = 1.96 \sqrt{\frac{0.49(1-0.49)}{799}} = 0.035.$$

b) We can be 95% confident that true proportion of teens admitted to misrepresenting their age online lies between $0.49 - E = 0.49 - 0.035 = 0.455$ and $0.49 + E = 0.49 + 0.035 = 0.525$.

c) The margin of error will be smaller. Being willing to accept a lower confidence level means we can "pin down" the mean proportion more closely – E is smaller – the interval is narrower.

d)

$$E = 1.645 \sqrt{\frac{0.49(1-0.49)}{799}} = 0.030.$$

e) Larger. Smaller samples (all other things remaining the same) produce larger margins of error.