

- (d) What if the sample size was 40 for the 99% confidence interval in (a). How would the confidence interval change with this larger sample size? No calculations necessary.
- The confidence interval would be the same width but shifted to the left
 - The confidence interval would be the same width but shifted to the right
 - The confidence interval would have the same center but be wider
 - The confidence interval would have the same center but be narrower
3. The *New York Times* and CBS News conducted a nationwide poll of 1048 randomly selected 13- to 17-year-olds. We can consider the sample to be a SRS.
- (a) Of these 1048 teenagers, 692 had a television in their room. Give a 95% confidence interval for the proportion of all people in this age group who had a TV in their room at the time of the poll
- (b) Of the 1048 teens surveyed, 189 named Fox as their favorite television network. Give a 90% confidence interval for the proportion of all people in this age group who would choose Fox as their favorite network.
- (c) Suppose you were to change the confidence level in (b) to 95% using the same sample. How would the confidence interval change? No calculations necessary.
- The confidence interval would be the same width but shifted to the left
 - The confidence interval would be the same width but shifted to the right
 - The confidence interval would have the same center but be wider
 - The confidence interval would have the same center but be narrower
4. We have IQ test scores of 31 seventh-grade girls in a Midwest school district. We have calculated that sample mean is 105.84 and the standard deviation is 14.27.
- (a) Give a 99% confidence interval for the average score in the population. What is the margin of error?

➤ **Confidence interval for population mean/proportion**

4. A hardware manufacturer produces bolts used to assemble various machines. Assume that the diameter of bolts produced by this manufacturer has an unknown population mean μ and the standard deviation is 0.1 mm. Suppose the average diameter of a simple random sample of 50 bolts is 5.11 mm.

(c) Calculate the margin of error of a 95% confidence interval for μ .

$$\text{margin of error} = 1.96 \frac{0.1}{\sqrt{50}} = 0.0277$$

(d) What is the width of a 95% confidence interval for μ ?

$$\text{width} = 2 * 0.0277 = 0.0554$$

5. You want to rent an unfurnished one-bedroom apartment in Boston next year. The mean monthly rent for a simple random sample of 32 apartments advertised in the local newspaper is \$1,400. Assume that the standard deviation is known to be \$220.

(e) Find a 99% confidence interval for the mean monthly rent for unfurnished one-bedroom apartments available for rent in this community.

$$\left(\bar{x} - z^* \frac{s}{\sqrt{n}}, \bar{x} + z^* \frac{s}{\sqrt{n}} \right)$$

$$= \left(1400 - 2.576 \frac{220}{\sqrt{32}}, 1400 + 2.576 \frac{220}{\sqrt{32}} \right)$$

$$=(1299.817, 1500.183)$$

(f) Does the confidence interval give us information about the statistic or the parameter?

Parameter

(g) How to interpret a 99% confidence interval for the mean?

e. 99% of the intervals constructed using this process based on same-sized samples from this population will include the sample mean.

f. 99% of the possible sample means

g. 99% of the intervals constructed using this process based on same-sized samples from this population will include the population mean.

h. 99% of the possible population means will be included by the interval.

(h) What if the sample size was 40 for the 99% confidence interval in (a). How would the confidence interval change with this larger sample size? No calculations necessary.

- e. The confidence interval would be the same width but shifted to the left
- f. The confidence interval would be the same width but shifted to the right
- g. The confidence interval would have the same center but be wider

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6. The *New York Times* and CBS News conducted a nationwide poll of 1048 randomly selected 13- to 17-year-olds. We can consider the sample to be a SRS.

(d) Of these 1048 teenagers, 692 had a television in their room. Give a 95% confidence interval for the proportion of all people in this age group who had a TV in their room at the time of the poll

$$n=1048, \hat{p} = \frac{692}{1048} = 0.6603, z^* = 1.96$$

$$\left(\hat{p} - z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}, \hat{p} + z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \right) = \left(0.6603 -$$

$$1.96 \sqrt{\frac{0.6603 \cdot 0.3397}{1048}}, 0.6603 + 1.96 \sqrt{\frac{0.6603 \cdot 0.3397}{1048}} \right)$$

$$= (0.6316, 0.6890)$$

(e) Of the 1048 teens surveyed, 189 named Fox as their favorite television network. Give a 90% confidence interval for the proportion of all people in this age group who would choose Fox as their favorite network.

$$n=1048, \hat{p} = \frac{189}{1048} = 0.1803, z^* = 1.645$$

$$\Rightarrow \left(0.1803 - 1.645 \sqrt{\frac{0.1803 \cdot 0.8197}{1048}}, 0.1803 + 1.645 \sqrt{\frac{0.1803 \cdot 0.8197}{1048}} \right)$$

$$= (0.1608, 0.1998)$$

(f) Suppose you were to change the confidence level in (b) to 95% using the same sample. How would the confidence interval change? No calculations necessary.

- e. The confidence interval would be the same width but shifted to the left
- f. The confidence interval would be the same width but shifted to the right

g. The confidence interval would have the same center but be wider

h. The confidence interval would have the same center but be narrower

4. We have IQ test scores of 31 seventh-grade girls in a Midwest school district. We have calculated that sample mean is 105.84 and the standard deviation is 14.27.

(a) Give a 99% confidence interval for the average score in the population. What is the margin of error?

90% CI for the mean

$$= \left(105.84 - 2.576 \frac{14.27}{\sqrt{31}}, 105.84 + 2.576 \frac{14.27}{\sqrt{31}} \right)$$

$$= (99.2378, 112.4422)$$

margin of error = 6.6022