Law of Large Numbers:

The variation in a set of data decreases as the sample size increases.

In general, the larger the data set the smaller the standard deviation.

Margin of Error Formula:

$\pm\frac{1}{\sqrt{n}}$ n = sample size

Convert this to a percent by x100.

Margin of Error: $\pm\frac{1}{\sqrt{n}} = \frac{1}{\sqrt{600}} \times 100 = \pm 4.08\%$

SOURCE: Exclusive poll done for the Free Press/WXYZ-TV (Channel 7) and our statewide media polling partners. The survey was done May 17-20 by Lansing-based EPIC-MRA. It was a 600-voter sample, using 20% cell phones, with an error margin of +/- 4 percentage points. About 20% of respondents were union members and 58% of respondents were at

This formula actually gives the margin of error reported in the article! It really works!!!

A random sample of 275 people shows that 44% are not satisfied with the job the governor is doing so far. What is the margin of error of this survey?

What is the interval that is most likely to contain the population proportion for the percent of people that are not satisfied?

$\frac{1}{\sqrt{275}} \times 100 = \pm 6\% \rightarrow 44\% \pm 6\%$

38% to 50%

What happens to the margin of error as the sample size increases?

Margin of error should decrease with a larger sample size

$$\pm\frac{1}{\sqrt{n}}$$

As sample size decreases?

Margin of error should increase with a smaller sample size.

What sample size would give the most accurate results?

The entire population - - EVERYBODY!

In a poll of 800 registered voters Mondale received 352 votes and Carter received 336 votes.

1. Find the sample propotion for each candidate rounded to the nearest tenth.

Mondale: $\frac{352}{800} = 44\%$ Carter: $\frac{336}{800} = 42\%$

2. Find the margin of error rounded to the nearest tenth.

$\frac{1}{\sqrt{800}} \times 100 = \pm 3.5\%$

3. Find the range of values for each candidate that likely contains their population proportion.

Mondale: 40.5% to 47.5% Carter: 38.5% to 45.5%

Should Mondale be confident that he has the election won?

Mondale: 40.5% to 47.5%

Carter: 38.5% to 45.5%

No.
Mondale could lose If he ends up on the lower end of his predicted range and Carter ends up on the upper end of his predicted range

A poll take before an election shows that 52% of registered voters are in favor of the Proposal. If the survey has a margin of error of ±4% estimate the number of voters in the poll to the nearest whole number.

$4\% \longrightarrow 0.04$

$$\frac{1}{\sqrt{n}} = \frac{0.04}{1} \rightarrow \frac{\sqrt{n}}{1} = \frac{1}{0.04} \rightarrow n = \left(\frac{1}{0.04}\right)^2$$

$n = 625$

A large high school in Texas has 800 juniors. In a survey of 230 of these juniors 102 already had career plans after high school.

1. Find the sample proportion. $\frac{102}{230} \times 100 \approx 44\%$

2. Find the margin of error $\frac{1}{\sqrt{230}} \times 100 \approx 6\%$

3. Find the interval that most likely contains the actual percentage (population proportion) of juniors who have actually decided on their future career plans. $44\% \pm 6\%$ → 38% to 50%

4. Find the interval for the actual number of juniors who have made this decision. $.38(800) = 304$, $.50(800) = 400$ → 304 to 400

A sample of 50 yogurt containers is taken off the production line and tested. 3 are found to have traces of E-coli.

1. Find the sample proportion. $\frac{3}{50} \times 100 = 6\%$

2. Find the margin of error. $\frac{1}{\sqrt{50}} \times 100 = 14\%$

3. If the manufacturer produces 3200 containers of yogurt a day how many of those will probably have traces of E-coli?

$6\% \pm 14\% \rightarrow -8\%$ to 20%

You can't have a negative percent → 0% to 20%

$(0)(3200)$ to $(.20)(3200)$

0 to 640

zero to 640 containers of yogurt may have traces of E-coli.

The highest rated Super Bowl was the XVI Game when 49% of the households watched the game. The margin of error was ±8%.

1. Find the number households that were in the survey. $\frac{1}{\sqrt{n}} = .08 \rightarrow n = \frac{1}{(.08)^2} = 156$

2. How would the margin of error change if the number of households surveyed were quadrupled? $\frac{1}{\sqrt{4n}} = \frac{1}{2} \cdot \frac{1}{\sqrt{n}}$

When the sample size is Quadrupled the margin of error is cut in half.

You can now finish:

Homework #20

Sec 12-5

Pages 680-682

Problems 2, 3, 7-10, 13-17, 31

3. A sample of 60 shoe laces coming off of the assembly has a mean length of 42.08 inches and a standard deviation of 0.23 inches.

c) Find the range of lengths that are within 2 standard deviations of the mean.

$\bar{x} \pm 2\sigma$

$42.08 \pm 2(0.23)$

42.08 ± 0.46

41.62 in to 42.48 in