

Name: _____

Date: _____

Confidence intervals

$$\text{standard error proportion} = \frac{0.5}{\sqrt{n}}$$

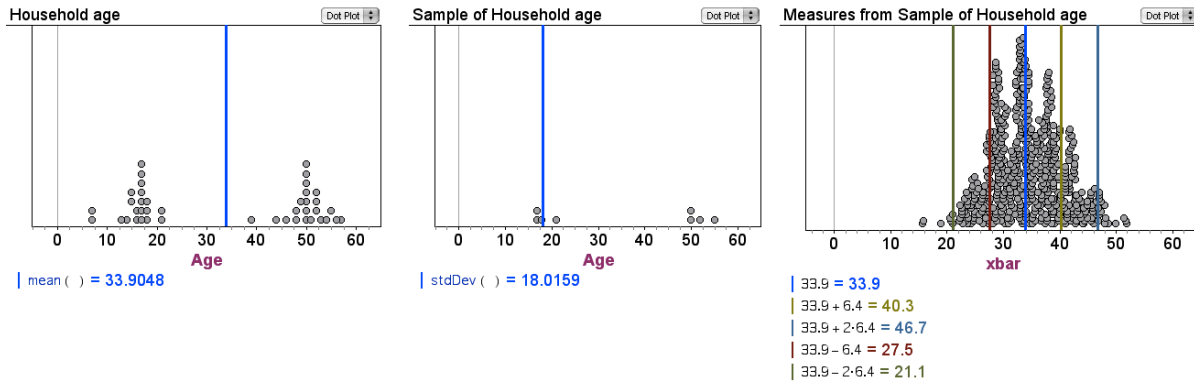
$$\text{standard error mean} = \frac{\text{standard deviation of sample}}{\sqrt{n}}$$

$$\text{margin of error} = 2 \cdot \text{standard error}$$

$$\hat{p} \pm \frac{1}{\sqrt{n}} \text{ and } \bar{x} \pm \frac{2s}{\sqrt{n}}$$

1. A survey is done, where $p = 0.6$, and the sample size is 400. Draw in a sampling distribution of all possible sample proportions, $\hat{p}$'s. Label key points on the graph.
2. A survey finds a confidence interval of (0.50, 0.76). What is the sample proportion, $\hat{p}$, and margin of error? Can you figure out what the sample size was?
3. A survey of 1000 people asks families how many pets they have. The sample results are $\bar{x} = 0.8$ and $s = 0.15$. Calculate the confidence interval for all possible sample results.
4. A survey of 250 people asks what incomes families earn. The survey reports a confidence interval of (25000, 61000). What is the $\bar{x}$ and margin of error? The researchers didn't report the sample's standard deviation, but you can calculate it now.
5. Explain the difference between bias and variability. Which is worse? Why?

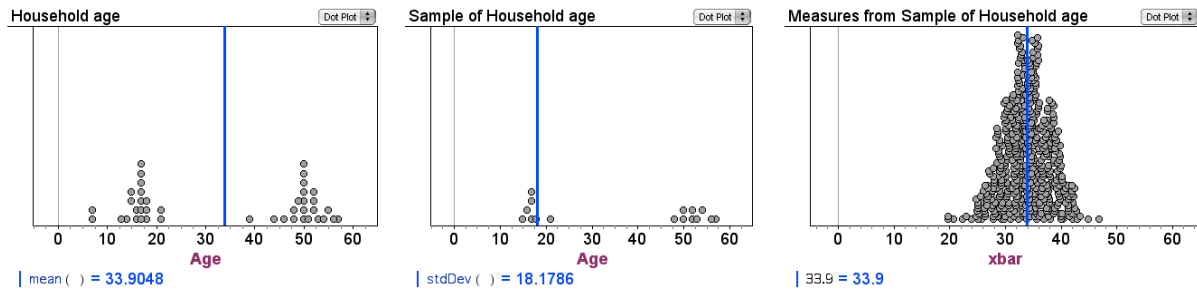
6. Here is the data from a short survey of high school students with a sample size of 8. The question was, “What is the age of the person living in your household with alphabetically first name?” If the first person is Adam, and Adam is 10, then “10” is the respondent’s answer.



A. I have marked the standard error and margin of error. Explain what they are.

B. There are 23 samples out of 550 that are above $\mu + \frac{2s}{\sqrt{8}}$ or below $\mu - \frac{2s}{\sqrt{8}}$. Why is that not surprising at all? For your information, μ is the true population mean.

7. Here is data for the same survey as #6, but with a sample size of 16:



A. Calculate the standard error and margin of error.

B. How does #7 compare to #6?

8. A poll contacts 300 Americans and finds that 170 are in favor of more government spending on renewable energy.

A. Calculate the sample proportion, $\hat{p}$.

B. Calculate the standard error and margin of error.

C. What is the likely range (or confidence interval) of the true p for the population?

D. How often will the truth fall outside of that confidence interval?

9. A poll contacts 700 Americans about a new bill in Congress:

Subgroups	Number contacted	Yes answers	$\hat{p}$	Margin of error	Confidence interval
Caucasian	458	142			
Hispanic/Latino	110	34			
African American	89	26			
Asian American	35	11			
Native American	8	2			
TOTAL	700	217			

This numbers of each subpopulation contacted (roughly) represents America's population demographics.

- A. Fill in the table.
- B. What did you notice about the margin of error for the subgroups versus the entire sample?
- C. Are there any subgroups that you can't tell whether they have majority support?
- D. Which subgroups definitely have different levels of support from other subgroups?