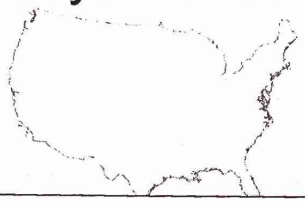
Name: _____ Hour: _____ Date: _____

Lesson 8.3: Day 2: How many states can you name?





How many states can you name in one minute? We will use this class as a random sample of high school seniors to estimate a 95% confidence interval for the mean number of states a senior can name in 1 minute.

1. When the timer starts, list as many states as you can on a piece of paper. Write the number of states you listed on the board.

2. What type of data is this? Categorical or quantitative? Quantitative → means

Categorical → proportions

2. Enter the class data at stapplet.com. Find the sample mean and standard deviation. Sketch the dotplot of the sample data.

$n =$ $\bar{x} =$ $s_x =$

3. Construct a 95% confidence interval to estimate the mean # of states a senior can name.

STATE: State the parameter you want to estimate and the confidence level.

Parameter: μ = true mean # of states Confidence level: 95%

PLAN: Identify the appropriate inference method and check conditions.

Name of procedure: One sample t interval for μ

Check conditions:
- Random: Assumed ✓
- 10%: $n <$ 10% all seniors
- Normal: $n \geq 30$ CLT OR Sample shows no strong skew or outliers.

DO: If the conditions are met, perform the calculations.

General Formula for any confidence interval: Point Estimate ± Margin of Error

Specific Formula for this confidence interval: $\bar{x} \pm t^* \frac{s_x}{\sqrt{n}}$

Plug numbers into the formula:

Answer:

CONCLUDE: Interpret your interval in the context of the problem.

Interpret: We are 95% confident that the interval from ___ to ___ captures the true mean # of states a senior can name in 1 min.

Name: _____ Hour: _____ Date: _____

Lesson 8.3 Day 2 – The Four Step Process

Important ideas:

LT #1 4 steps (Changes)

State: μ → true mean

Plan: One sample t interval for μ
Normal Condition
- Pop. is Normal
- $n \geq 30$ CLT
- sample shows no strong skew or outliers

DO: $\bar{x} \pm t^* \frac{s_x}{\sqrt{n}}$

Conclude: - None

LT #2 Sample Size

Margin of Error $= t^* \frac{s_x}{\sqrt{n}}$

Use z^* in place of t^* if it's unknown.

Check Your Understanding

1. Administrators at your school want to estimate how much time students spend on homework, on average, during a typical week. They want to estimate μ at the 90% confidence level with a margin of error of at most 30 minutes. A pilot study indicated that the standard deviation of time spent on homework per week is about 154 minutes. How many students need to be surveyed to meet the administrators' goal?

$30 = 1.645 \times \frac{154}{\sqrt{n}}$ $\quad \sqrt{n}^2 = \left(\frac{1.645 \times 154}{30}\right)^2$

$\sqrt{n} = \frac{1.645 \times 154}{30}$ $\quad n = 71.31 \rightarrow$ **72 students**

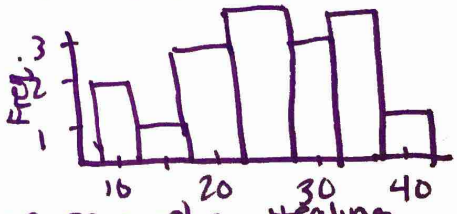
2. Biologists studying the healing of skin wounds measured the rate at which new cells closed a cut made in the skin of an anesthetized newt. Here are data from a random sample of 18 newts, measured in micrometers (millionths of a meter) per hour:

29 27 34 40 22 28 14 35 26 35 12 30 23 18 11 22 23 33

Calculate and interpret a 95% confidence interval for the mean healing rate μ.

State: Estimate a μ → true mean healing rate at 95% level

Plan: One sample t interval for μ
Random: "random sample of 18" ✓
10%: $18 < \frac{1}{10} *$ All newts ✓
Normal: NO strong skew or outliers in sample ✓



DO: Pt. Est ± margin of error

$\bar{x} \pm t^* \frac{s_x}{\sqrt{n}} \rightarrow 25.67 \pm 2.110 \frac{8.32}{\sqrt{18}} \rightarrow (21.53, 29.81)$

Conclude: We are 95% confident that the interval from 21.53 to 29.81 micrometer per hour captures the true mean healing rate.