

## Guided Notes – 8.3 Estimating a Population Mean CI

1. Inference about population proportions (\_\_\_\_) based on \_\_\_\_\_ variables.
  - Proportions are \_\_\_\_\_.
2. Inference about population means (\_\_\_\_) based on \_\_\_\_\_ variables.
  - Means are \_\_\_\_\_.
3. In most real world problems, we do **NOT** know the population \_\_\_\_\_ ( $\mu$ ) or \_\_\_\_\_ ( $\sigma$ ), therefore we **cannot use** the **Z-statistic** for **inference for means**.
  - We will learn a new test statistic in this chapter that will always be used for inference tests with means called the **t-Statistic**
  - You will **NEVER** be asked to do a “1 Sample Z-interval for a population mean”. We never know the population standard deviation ( $\sigma$ ), so this is a useless test.

## Estimating Sample Sizes for Means

4. What is the formula to **calculate the sample size for means**?
  - a) What statistic will be used to calculate **the sample size for means**? \_\_\_\_\_
  - b) What critical value will be used to calculate **the sample size for means**? \_\_\_\_\_
  - c) What conditions are required?
    1. R \_\_\_\_\_
    2. I \_\_\_\_\_
    3. N \_\_\_\_\_
    4. Plus **you must know** the population \_\_\_\_\_ ( $\sigma$ )

5. Describe the three steps for choosing a sample size for a desired margin of error when estimating  $\mu$ .

6. Complete the Check Your Understanding “Monkeys” -- page 501-502.

1) Define population parameter	$\mu =$ _____
2) Get information to estimate the sample size	$CL =$ _____ $z^* =$ _____ $\sigma =$ _____ $ME =$ _____
3) Use formula used to determine the sample size $n$ for a population mean:	$z^* \frac{\sigma}{\sqrt{n}} \leq ME.$ Solve for $n$ .
4) Substitute numbers and clearly show all steps to calculate the sample size $n$	
5) Always round _____ whole number to ensure ME is met.	We need to sample _____

7. It is the size of the \_\_\_\_\_ that determines the margin of error. The size of the \_\_\_\_\_ does not influence the sample size we need. This is true as long as the population \_\_\_\_\_.

### 8.3 Estimating a Population Mean when " $\sigma$ KNOWN"

8. What is the standardized value of the z-statistic?

a) See Figure 8.11 to understand this new z-statistic

Sketch the sampling distribution of $\bar{x}$ when the normal condition is met and $\sigma$ is known.	Compare the distributions	Sketch the standard normal distribution .
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b) When we don't know " $\sigma$ ," we estimate it using the \_\_\_\_\_; creating a new statistic called the "**t-statistic.**"

9. SKIP "Bingo" Activity

10. What is the fomula for the "**t-statistic**"?

a) How do you calculate the degrees of freedom for a t distribution?

**See Figure 8.13 to understand the t-statistic**

<p>b) Sketch normal distribution; t-distrib. with <math>df=9</math>; and t-distrib. with <math>df=2</math>.</p>	<p>c) Describe the similarities between a standard normal distribution and a t distribution.</p> <p>d) Describe the differences between a standard normal distribution and a t distribution.</p> <p>e) What happens to the t distribution as the degrees of freedom increase?</p>
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11. How do you find the critical value  $t^*$  using TI84? You only need to know how to use Table B if you have a TI83.

12. Check Your Understanding -- page 507 (use TI84, sketch the graph, answers in back of book)

<p>a)</p>	<p>b)</p>	<p>c)</p>
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<p>13) What is the formula for the <u>standard deviation of the sampling distribution</u> of the sample mean <math>\bar{x}</math> ?</p>	<p>14) What is the <u>standard error</u> of the sample mean <math>\bar{x}</math> ?</p>
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General form to calculate a confidence interval is on the Green Sheet:  
statistic  $\pm$  (critical value)  $\bullet$  (standard deviation of the statistic)

15. What is the formula for a *1-sample t- interval for a population mean?*

- a) What statistic will be used to calculate this confidence interval? \_\_\_\_\_
- b) What is the critical value? \_\_\_\_\_ with df= \_\_\_\_\_
- c) What part of this formula is the margin of error (ME)? \_\_\_\_\_

16. What conditions are required for a *1-sample t- interval for a population mean?*

- R \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
- N \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
- I \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_

17. Walk through example “Video Screen Tension.”

- You do not need to write the problem.
- Enter the data and use your calculator to replicate all steps. See “Technology Corner” page 514.
- **Your Notes:**

18. “Auto Pollution” example is optional. **Your Notes:**

19. What is a “Robust” procedure? And, when are t-procedures NOT robust?

20. Describe the 2 different normal conditions when using t-procedures:

- \_\_\_\_\_ ( $n < 15$  and  $n < 30$ )

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- \_\_\_\_\_ ( $n \geq 30$ )

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21. Walk through example “People, Trees, and Flowers.” **Your Notes:**