Guided Notes – 8.3 Estimating a Population Mean CI

1. Inference about population proportions (\_\_\_\_) based on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ variables.
   * + Proporations are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. Inference about population means (\_\_\_\_) based on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ variables.
   * + Means are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. In most real world problems, we do **NOT** know the population \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (μ) or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(σ), 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 (σ), so this is a useless test.

Estimating Sample Sizes for Means

1. What is the formula to **calculate the sample size for means**?
2. What statistic will be used to calculate **the sample size for means**? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. What critical value will be used to calculate **the sample size for means**? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. What conditions are required?
   1. R\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. I\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. N\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   4. Plus **you must know** the population \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(σ)
5. Describe the three steps for choosing a sample size for a desired margin of error when estimating μ.
6. Complete the Check Your Undertanding “Monkeys” -- page 501-502.

|  |  |
| --- | --- |
| 1. Define population parameter | μ= |
| 1. Get information to estimate the sample size | CL= \_\_\_\_\_\_\_\_\_\_\_ z\*= \_\_\_\_\_\_\_\_\_\_\_\_\_\_  σ= \_\_\_\_\_\_\_\_\_\_\_\_\_ ME= \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 1. Use formula used to determine the sample size *n* for a population mean: | . Solve for *n.* |
| 1. Substitute numbers and clearly show all steps to calculate the sample size *n* |  |
| 1. **Always round \_\_\_**\_\_\_\_**\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_whole number to ensure ME is met.** | We need to sample \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

1. 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 “σ KNOWN”

1. What is the standardized value of the z-statistic?
2. See Figure 8.11 to understand this new z-statistic

|  |  |  |
| --- | --- | --- |
| Sketch the sampling distribution of when the normal condition is met and **σ** is known. | Compare the distributions | Sketch the standard normal distribution . |

1. When we don’t know “**σ,”** we estimate it using the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_; creating a **new statistic called the “t-statistic.”**
2. SKIP “Bingo” Actvity
3. What is the fomula for the “**t-statistic**”?
4. How do you calculate the degrees of freedom for a t distribution?

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

|  |  |
| --- | --- |
| 1. Sketch normal distribution;t-distrib. with df=9; and t-distrib. with df=2. | 1. Describe the similarities between a standard normal distribution and a t distribution. 2. Describe the differences between a standard normal distribution and a t distribution. 3. What happens to the t distribution as the degrees of freedom increase? |

1. 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.
2. Check Your Understanding -- page 507 (use TI84, sketch the graph, answers in back of book)

|  |  |  |
| --- | --- | --- |
| a) | b) | c) |

|  |  |
| --- | --- |
| 13) What is the formula for the ***standard deviation of the sampling distribution*** of the sample mean ? | 14) What is the ***standard error*** of the sample mean ? |

**General form to calculate a confidence interval is on the Green Sheet:**

**statistic ± (critical value) ● (standard deviation of the statistic)**

1. What is the formula for a ***1-sample t- interval for a population mean?***
2. What statistic will be used to calculate this confidence interval? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. What is the critical value? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with df=\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. What part of this formula is the margin of error (ME)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. What conditions are required for a ***1-sample t- interval for a population mean***?
   * + R\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + - N\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + - I\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. 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**:

1. “Auto Pollution” example is optional. **Your Notes**:
2. What is a “Robust” procedure? And, when are t-procedures NOT robust?
3. Describe the 2 different normal conditions when using t-procedures:
   * + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (n<15 and n<30)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (n≥30)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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