Topic 7.1

Introducing Statistics: Should I Worry About Error?

Should I Worry About Error?

Unit 7 expands the processes and methods presented in Unit 6 to analyze quantitative data for the purpose of making inferences about population means.

In this unit, we will be introduced to the t-distribution and the reasons why we use this distribution to make inferences about means when the population standard deviation is not known. We will learn how to construct a confidence interval (CI) for a population mean and for a population mean difference for paired (matched) data, and how to justify a claim based on the constructed intervals. We will also learn how to conduct a hypothesis test for a population mean and for a population mean difference, how to interpret the results of the test based on its p-value and a significance level of interest, and how to justify a claim about the population mean or the population mean difference. Finally, we will extend these processes and methods to construct a CI and conduct a hypothesis test for a difference in population means.

> **To prepare for the AP exam, we suggest focusing on developing the following skills:**
>
> - Describe the t-distribution and its parameter (the degrees of freedom), and how it compares to the normal distribution.
> - For estimating a population mean, a population mean difference, and a difference in population means, be able to:
>   - Identify an appropriate CI procedure.
>   - Verify whether the conditions for constructing the CI are met.
>   - Calculate the standard error and margin of error for the CI.
>   - Calculate the appropriate CI.
>   - Interpret a CI in context and justify a claim based on the constructed interval.
>   - Identify the relationships between sample size, width of a CI, confidence level, and margin of error for each CI.
> - For testing a population mean, a population mean difference, and a difference in population means, be able to:
>   - Identify the appropriate null and alternative hypotheses and testing procedure.
>   - Verify the conditions and calculate the appropriate test statistics and p-value.
>   - Interpret the p-value and justify a claim (compare the p-value to a significance level) about the parameters in context.
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> *Note: It is not required to memorize the formulas for the CI and test statistics. The AP exam provides these formulas. However, specific conditions for these inferential procedures must be memorized.*