

Topic 6.1

Introducing Statistics: Why Be Normal?

Why Be Normal?

Unit 6 introduces the processes and methods used to make statistical inferences that will apply to the rest of the course. Statistical inference is used to construct and interpret confidence intervals (CIs) to estimate population parameters (ex. population proportion) and to conduct significance (hypothesis) tests to evaluate claims about population parameters (ex. population proportion). Unit 6 analyzes categorical data to make inferences about (binomial) population proportions.

In this unit, we will learn how to construct a CI for a population proportion and how to justify a claim based on the constructed interval. We will also learn how to conduct a hypothesis test for a population proportion, 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 proportion. We will identify Type I and Type II errors in hypothesis testing, their probabilities, and the factors that affect the probability of errors during the hypothesis testing process. Finally, we will extend these processes and methods to construct a CI for a difference in population proportions, and to conduct a hypothesis test for a difference in population proportions.

To prepare for the AP exam, we suggest focusing on developing the following skills:

- For estimating a population proportion and a difference in population proportions, the ability 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.
 - Estimate the sample size that will result in a given margin of error of a CI (for a population proportion only).
- For testing a population proportion and a difference in population proportions, the ability 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.
- Ability to describe Type I and Type II errors in context, determine which is more consequential, calculate their probability, and identify factors that may affect that probability.

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.