

Topic 8.1

Introducing Statistics: Are My Results Unexpected?

Are My Results Unexpected?

Unit 8 expands the processes and methods presented in Unit 6 to analyze categorical data when there are two or more categories. The chi-square test is a hypothesis (statistical) test used in the analysis of two-way tables when certain conditions are met. The AP Statistics course focuses on three different chi-square tests: the chi-square test for goodness of fit to evaluate the distribution of a single categorical variable in a population, the chi-square test for independence to evaluate the association between two categorical variables in a population, and the chi-square test for homogeneity of proportions to compare the distribution of a single categorical variable across independent populations or experimental groups.

In this unit, we will be introduced to the chi-square distribution. We will learn how to frame the null and alternative hypotheses for each of the chi-square tests, how to calculate the expected, and how to check the conditions needed for each test. We will also learn how to conduct each of the chi-square tests, how to interpret the results of the test based on the p -value and a significance level of interest, and how to justify a claim about the population (or populations) based on the results of the tests.

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

- Describe the chi-square distribution and its properties.
- Identify an appropriate testing procedure for the distribution of a categorical variable in a population.
 - For the chi-square test for goodness of fit, be able to:
 - Identify the null and alternative hypotheses.
 - Calculate the expected counts, verify the conditions, and calculate the test statistic.
 - Identify the distribution (including the specific degrees of freedom) of the test statistic.
 - Determine and interpret the p -value.
 - Justify a claim about the population based on the results.
- Identify an appropriate testing procedure to compare the distribution of categorical data in two-way tables.
 - For a chi-square test for homogeneity or independence, be able to:
 - Identify the null and alternative hypotheses.
 - Calculate the expected counts, verify the conditions, and calculate the test statistic.
 - Identify the distribution (including the specific degrees of freedom) of the test statistic.
 - Determine and interpret the p -value.
 - Justify a claim about the population based on the results.

Note: It is not required to memorize the formulas for the chi-square test statistic. The AP exam provides the formula. However, specific conditions for these inferential procedures must be memorized.