

# THE CHI-SQUARE DISTRIBUTION: PRACTICE 1\*

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## Abstract

This module provides a practice on Chi-Square Distribution as a part of Collaborative Statistics collection (col10522) by Barbara Illowsky and Susan Dean.

## 1 Student Learning Outcomes

- The student will explore the properties of goodness-of-fit test data.

## 2 Given

The following data are real. The cumulative number of AIDS cases reported for Santa Clara County through December 31, 2003, is broken down by ethnicity as follows:

Ethnicity	Number of Cases
White	2032
Hispanic	897
African-American	372
Asian, Pacific Islander	168
Native American	20
	<b>Total = 3489</b>

Table 1

The percentage of each ethnic group in Santa Clara County is as follows:

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Source URL: <http://cnx.org/content/col10522/latest/>

Saylor URL: <http://www.saylor.org/courses/ma121/>

<http://cnx.org/content/m17054/1.10/>

Attributed to: Barbara Illowsky and Susan Dean



Ethnicity	Percentage of total county population	Number expected (round to 2 decimal places)
White	47.79%	1667.39
Hispanic	24.15%	
African-American	3.55%	
Asian, Pacific Islander	24.21%	
Native American	0.29%	
	<b>Total = 100%</b>	

Table 2

### 3 Expected Results

If the ethnicity of AIDS victims followed the ethnicity of the total county population, fill in the expected number of cases per ethnic group.

### 4 Goodness-of-Fit Test

Perform a goodness-of-fit test to determine whether the make-up of AIDS cases follows the ethnicity of the general population of Santa Clara County.

**Exercise 1**

$H_o$  :

**Exercise 2**

$H_a$  :

**Exercise 3**

Is this a right-tailed, left-tailed, or two-tailed test?

**Exercise 4**

degrees of freedom =

*(Solution on p. 4.)*

**Exercise 5**

Chi<sup>2</sup> test statistic =

*(Solution on p. 4.)*

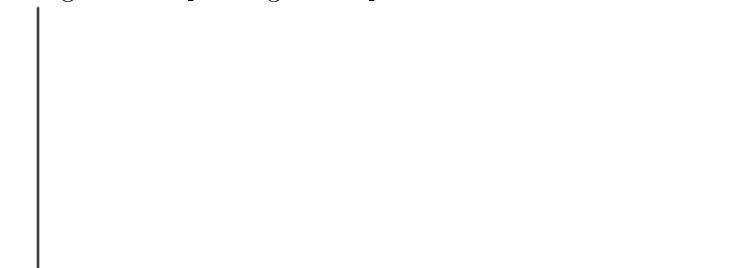
**Exercise 6**

p-value =

*(Solution on p. 4.)*

**Exercise 7**

Graph the situation. Label and scale the horizontal axis. Mark the mean and test statistic. Shade in the region corresponding to the p-value.



Let  $\alpha = 0.05$

Decision:



Reason for the Decision:

Conclusion (write out in complete sentences):

## 5 Discussion Question

### Exercise 8

Does it appear that the pattern of AIDS cases in Santa Clara County corresponds to the distribution of ethnic groups in this county? Why or why not?



## Solutions to Exercises in this Module

### **Solution to Exercise 4 (p. 2)**

degrees of freedom = 4

### **Solution to Exercise 5 (p. 2)**

1132.12

### **Solution to Exercise 6 (p. 2)**

Rounded to 4 decimal places, the p-value is 0.0000.

