

**Problem 1 – Introduction to the chi-square**

Suppose a certain popular brand of candy pieces comes in five colors. A student counted the number of pieces of each color in a bag and found the results shown in the table below.

| Color | Yellow | Red | Blue | Orange | Green |
|--------|--------|-----|------|--------|-------|
| Amount | 11 | 19 | 25 | 17 | 13 |

1. How many pieces of candy were in the bag?
2. If the proportions of each color were the same, compute how many pieces of each color you would expect to find.
3. Enter the numbers in the table in list **L1**. Compute the (Observed – Expected) value for each candy color in list **L2**.
4. Do you think that there is a considerable difference between the observed values and the expected values?
5. Does it make sense to find the sum of the differences (Observed – Expected) to describe the total difference? Why or why not?
6. In list **L3**, compute $\frac{(\text{Observed} - \text{Expected})^2}{\text{Expected}}$ for each color. Then calculate the sum of these values in **L4(1)**.
7. In **L4(2)**, compute the cumulative chi-square density using the χ^2 **cdf**(command.
8. Write the p -value for this bag of candy as a percent.
9. Based on your p -value in question 8, is there sufficient evidence to reject the hypothesis that the bag of candy came from a process that produced equal numbers of colors? Explain.

Problem 2 – A second bag

A student opened a bag of a second brand of candy, counted the number of pieces of each color, and found the results shown in the table below.

| Color | Brown | Yellow | Red | Blue | Orange | Green |
|--------|-------|--------|-----|------|--------|-------|
| Amount | 15 | 14 | 16 | 35 | 29 | 24 |

10. Clear lists **L1**, **L2**, **L3**, and **L4**. Compute the chi-square value.
11. Find the p -value.
12. Determine if it is likely that this bag of candy came from a manufacturing process that was designed to produce equal numbers of each color. Explain.

The student looked at the company's website and found that they claim to produce the colors in the following proportions.

Brown: 13%, Yellow: 14%, Red: 13%, Blue 24%, Orange 20%, Green: 16%

13. Compute the chi-square value using these proportions of colors. (Hint: First find the new expected values.)
14. Find the p -value.
15. Determine if it is likely that this bag of candy came from a manufacturing process that was designed to produce the colors in the proportions given on the website. Explain.