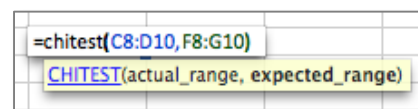


Chi-Square Tests in Excel 2011

Instructions for Mac Users

Note: These directions include both how to complete a Chi-Square Test of Independence and Goodness of Fit.

- I. Chi-Square Test of Independence with Two-Way Contingency Table
 1. Start with a two-way contingency table (see previous instructions). You want the table to show the counts, not the percentages.
 2. Make a new table in the blank cells beneath the pivot table titled "*Observed*." Type in the different category labels of each variable just how they appear in the pivot table (one across the top row and one down the first column).
 3. Copy the counts, including totals, from the pivot table into the new "*Observed*" table, making sure the categories are lined up with the correct counts. Only the values are needed for pasting. To paste values only, select that cell you want to paste in then push Ctrl and click, to bring up the paste menu. Select to paste 'values.'
 4. In the blank cells under the "*Observed*" table, make a new table with the same column and row labels and title it "*Expected*."
 5. Fill in the expected counts in all cells of the table using the following formula: **= [row total] * [column total] / [overall total count]**.
 6. In the blank cells under the "*Expected*" table, make a new table with the same column and row labels and title it "*Chi-Square*."
 7. Fill in the individual chi-square scores for each cell of the table using the same formula as in the goodness of fit test: **= ([observed count] – [expected count])^2 / [expected count]**.
 8. Once all of the chi-square values are calculated, in an empty cell type **= SUM(** and highlight all of the cells in the "*Chi-Square*" table. Then hit **Return**. This is your chi-square statistic for the test of independence.
 9. To find the p-value of this statistic, you can use the **CHIDIST** function, described above, except now the degrees of freedom is equal to the number of columns minus one times the number of rows minus one.
 10. Alternatively, you can use the **CHITEST** function. For this function, type **= CHITEST(** and then highlight all of the counts (not including the row and column totals) of the "*Observed*" table, then a comma, and then highlight all of the counts (not including the totals) of the "*Expected*" table. This function also returns the p-value of the test.



- If the resulting p-value is less than 0.05, you would reject the null hypothesis that states that the two variables are independent. If the p-value is greater than 0.05, you would fail to reject the null hypothesis.

II. Chi-Square Goodness of Fit Test with One-Way Contingency Table

- Start with a one-way contingency table (see previous instructions). You want the table to show the counts of each category, not the percentages.
- Make a new table in the blank cells beneath the pivot table titled "*Observed*." Type in the different category labels in the first column.
- Copy and paste as values the counts from the pivot table into the new table, making sure the categories are lined up with the correct counts.
- Beneath the last category, make a "*Total*" row, and copy the **Grand Total** count from the pivot table.

Observed		Expected	
high	26	high	20
medium	19	medium	20
low	15	low	20
Total	60	Total	60

- In the blank cells next to the "*Observed*" table, make an "*Expected*" table, with the same category labels and a "*Total*" row at the bottom.
- For the expected counts, type = **[total count] / [number of categories]**. Copy this number for each category, and then type in the total count again in the last row.
- In the blank cells next to the "*Expected*" table, create a third table titled "*Chi-Square*." Again, copy all of the category labels.
- Fill in the chi-square score for each category using the following formula: = **([observed count] – [expected count])^2 / [expected count]**.
- Sum all of the values by typing = **SUM**(and selecting the chi-square values. Then hit **Return**. This is your chi-square statistic for the goodness of fit test.
- To find the p-value of this statistic, use the **CHIDIST** function, which requires two inputs: your chi-square statistic (referred to as x) and the

=chidist(3.1,2)
CHIDIST(x, deg_freedom)

degrees of freedom (the number of categories minus one). In an empty cell, type: = **CHIDIST**([chi-square statistic], [degrees of freedom]).

- If the resulting p-value is less than 0.05, you would reject the null hypothesis that states there is no difference in the counts of each category. If the p-value is greater than 0.05, you would fail to reject the null hypothesis.