

Chapter 8 / Example 2

χ^2 test

The GDC can work out the values of the expected frequencies, the chi squared statistic, the p -value and the number of degrees of freedom.

Eighty people were asked for their favourite genre of music: pop, classical, folk or jazz. The results are in the following table.

Genre	Pop	Classical	Folk	Jazz	Totals
Male	18	9	4	7	38
Female	22	6	7	7	42
Totals	40	15	11	14	80

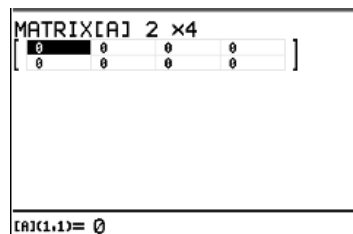
A χ^2 test was carried out at the 1% significance level. The critical value for this test is 11.345.

- Write down the null and alternative hypotheses.
- Show that the expected value for a female liking pop is 21.
- Write down the number of degrees of freedom.
- Find the χ^2 test statistic and the p -value.
- State whether the null hypothesis is accepted or not, giving a reason for your answer.

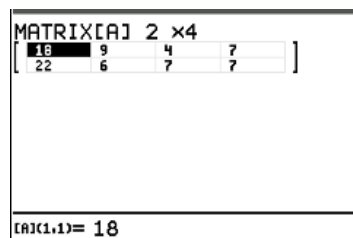
First you will enter the observed frequencies in a matrix. This is an array of numbers, in this case two rows by 4 columns. The row and column totals are not included in the matrix.

Press $\boxed{2\text{nd}} \boxed{x^{-1}} \boxed{[M\text{ATRIX}]}$. Press $\boxed{\blacktriangleright} \boxed{\blacktriangleright}$ to access the EDIT menu.

Select 1:[A] and edit the dimensions of the matrix so that they read 2 \times 4.



Enter the data into the matrix. (Not the totals). Press $\boxed{\text{enter}}$ after each item.

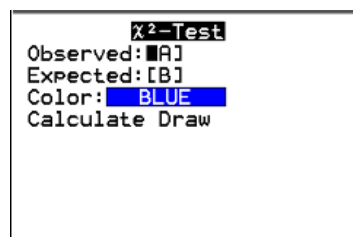


Press $\boxed{\text{stat}}$. Press $\boxed{\blacktriangleright} \boxed{\blacktriangleright}$ to access the TESTS menu.

Select C: χ^2 -Test.

You should be able to leave the entries in the template unchanged.

Use $\boxed{\blacktriangledown}$ to navigate down to Calculate. Press $\boxed{\text{enter}}$.



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The χ^2 statistic is 1.62, the p -value is 0.654 and the number of degrees of freedom is 3.

Since $0.654 > 0.01$ or $1.622 < 11.345$, you accept the null hypothesis: favourite music genre is independent of gender.

```

χ²-Test
χ²=1.622237412
p=.654358213
df=3
  
```

Press **2nd** **[quit]** to enter the home screen.

Press **2nd** **[x⁻¹]** **[MATH]**. From the NAMES menu select 2:[B] and press **enter**.

These are the expected values.

The expected value for a female liking pop is 21.

```

[B]
[19 7.125 5.225 6.65]
[21 7.875 5.775 7.35]
  
```