

χ^2 test

Intro

In this presentation we will learn how to calculate the χ^2_{calc} and the p -value on the GDC.

Calculations

We start with the observed data. Suppose the table below shows our observed data:

	A	B	C
X	10	20	5
Y	20	15	20

We need to input this data into GDC.

Casio - very old ones

Go to the main menu and choose the third app - MATRIX. When Mat A is highlighted press right arrow to change the dimensions. We want 2×3 as we have 2 rows and 3 columns. Press EXE and enter the data.

Now go back to the main menu and choose the second app - STATS. Press TEST \rightarrow CHI and make sure the Observed matrix is set to matrix A. Press execute. You should get:

$$\chi^2_{calc} = 9.05 \quad p = 0.010834$$

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Casio - not so old ones

Go to the main menu and choose the second app - STAT.

Press TEST → CHI → 2WAY

Now we need to enter the data into a matrix. Press ▶MAT (the second option, not just MAT). Now press right arrow to change the dimensions of a given matrix into 2×3 as we have 2 rows and 3 columns. Press EXE and enter the data. Now press EXE and you will be back at the previous screen. Now make sure that your matrix is set as the observed data and press execute.

You should get:

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You should get:

$$\chi_{calc}^2 = 9.05$$

$$p = 0.010834$$

We first need to input our data. Press MATRIX (2^{nd} \rightarrow x^{-1}). Go to EDIT and choose your matrix (say matrix A). Specify the dimensions (in our example 2×3 as we have 2 rows and 3 columns). Enter the data.

Now press STAT \rightarrow TESTS \rightarrow χ^2 -Test. Make sure the observed data is set to your matrix. Press calculate.

You should get:

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You should get:

$$\chi_{calc}^2 = 9.05$$

$$p = 0.010834$$

Example 1

Try calculating χ^2_{calc} and the p -value for the following observed data:

	A	B	C
X	30	20	15
Y	20	20	10

You should get:

$$\chi^2_{calc} = 1.0615$$

$$p = 0.58815$$

Example 1

Try calculating χ_{calc}^2 and the p -value for the following observed data:

	A	B	C
X	30	20	15
Y	20	20	10

You should get:

$$\chi_{calc}^2 = 1.0615 \quad p = 0.58815$$

Example 2

Try calculating χ^2_{calc} and the p -value for the following observed data:

	A	B	C
X	30	10	25
Y	20	10	10
Z	10	20	5

Note that now the dimensions are 3×3

You should get:

$$\chi^2_{calc} = 21.346$$

$$p = 2.7035 \times 10^{-4}$$

Example 2

Try calculating χ_{calc}^2 and the p -value for the following observed data:

	A	B	C
X	30	10	25
Y	20	10	10
Z	10	20	5

Note that now the dimensions are 3×3

You should get:

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Note that now the dimensions are 3×3

You should get:

$$\chi_{calc}^2 = 21.346$$

$$p = 2.7035 \times 10^{-4}$$

Example 3

Try calculating χ^2_{calc} and the p -value for the following observed data:

	A	B	C	D
X	30	10	25	25
Y	20	10	20	10
Z	10	20	25	20

Note that now the dimensions are 3×4

You should get:

$$\chi^2_{calc} = 15.706$$

$$p = 0.015421$$

Example 3

Try calculating χ^2_{calc} and the p -value for the following observed data:

	A	B	C	D
X	30	10	25	25
Y	20	10	20	10
Z	10	20	25	20

Note that now the dimensions are 3×4

You should get:

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Z	10	20	25	20

Note that now the dimensions are 3×4

You should get:

$$\chi_{calc}^2 = 15.706 \quad p = 0.015421$$

Example 4

Try calculating χ^2_{calc} and the p -value for the following observed data:

	A	B	C	D
X	10	20	25	25
Y	20	10	40	30

Note that now the dimensions are 2×4

You should get:

$$\chi^2_{calc} = 8.465$$

$$p = 0.037317$$

Example 4

Try calculating χ^2_{calc} and the p -value for the following observed data:

	A	B	C	D
X	10	20	25	25
Y	20	10	40	30

Note that now the dimensions are 2×4

You should get:

$$\chi^2_{calc} = 8.465$$

$$p = 0.037317$$

Example 4

Try calculating χ^2_{calc} and the p -value for the following observed data:

	A	B	C	D
X	10	20	25	25
Y	20	10	40	30

Note that now the dimensions are 2×4

You should get:

$$\chi^2_{calc} = 8.465 \quad p = 0.037317$$