

THE CHI-SQUARED GOODNESS-OF-FIT TEST

CASIO CFX-9850GB PLUS INSTRUCTIONS

A sample of 100 digits were randomly generated using a calculator random number generator. If the digits generated are random, we would expect that the outcomes could be modelled by a discrete uniform distribution. The following data were obtained:

Score (x)	0	1	2	3	4	5	6	7	8	9
Observed frequency (f_o)	10	17	13	7	15	3	8	12	6	9
Expected frequency (f_e)	10	10	10	10	10	10	10	10	10	10

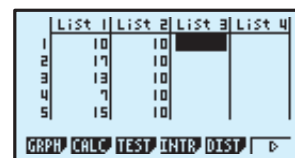
The data can be tested to see if it is indeed random using the following steps:

Step 1: Choose the **Stat** menu from the main menu.



Step 2: Enter the observed frequencies into **List 1** and the expected frequencies into **List 2**.

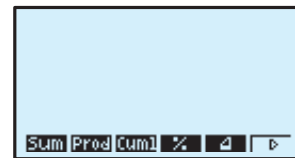
When you have finished entering the data, press **MENU**, then choose **Run**.



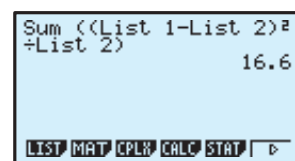
Step 3: χ^2 is calculated using the following formula:

$$\chi^2 = \sum \frac{(f_o - f_e)^2}{f_e}$$

To calculate a sum press **OPTN** **F1** (List) **F6** **F6** **F1** (Sum). Press **F6** to return to the start of this menu.



Now press **(C)** **(C)** **F1** (List) **1** **=** **F1** (List) **2** **)** **x^2** **÷** **F1** (List) **2** **)** **EXE** to calculate χ^2 .

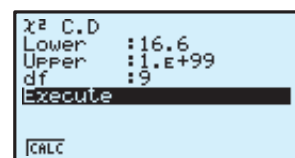


Step 4: Press **MENU** to return to the main menu and choose the **Stat** menu.

To calculate the p -value, press **F5** (DIST) **F3** (CHI) **F2** (Ccd).

Enter 16.6, the χ^2 value from above, as the lower bound, to set up the screen as shown.

Highlight **Execute** and press **F1** to do the calculation.



Since the p -value of 0.0554 is greater than 0.05, we do not reject H_0 . Hence there is insufficient evidence to suggest that the calculator is not generating the digits randomly.

Warning: If $f_e < 5$, remember to combine classes.

