TI-84 χ^2 Goodness of Fit Test

The TI-84 can calculate a goodness-of-fit test.

Begin by entering the observations in the Lists in the calculator. You will find these by pressing [STAT] and then selecting Edit… Then enter the observations into L_1. In L_2 you will need to enter the expected values for each. You will need to use the probabilities provided, or the distribution provided multiplied by the total number of observations to obtain these values.

Consider the example: Below is a table of data for the sex of kittens in a sample of litters of 4 kittens. The data collected is below. The number of females born in each litter should be distributed binomially with $p = 0.5$. Conduct a hypothesis test to see if this data fits that model.

Number of females in the litter	0	1	2	3	4
Number of litters	13	30	94	50	18

The observations go into L_1: $\{13, 30, 94, 50, 18\}$.

To calculate the expectations, the binomial distribution has probabilities $b(x; 4, 0.5) = \binom{4}{x} 0.5^4$ (since $1 - 0.05 = 0.5$ the formula simplifies). You can calculate the 5 probabilities you need using the **A: binomialpdf(** function from the DISTR menu ([2nd] [VARS]). Use this to calculate the distribution, with each x from the table going into the function in the last position. In this example $\{\frac{1}{16}, \frac{1}{4}, \frac{3}{8}, \frac{1}{4}, \frac{1}{16}\}$. Multiply this by the total observations: 205, to obtain the values for L_2.

```
EDIT CALC TESTS
B↑2-PropZInt…
C:X²-Test…
D:X²GOF-Test…
E:2-SampFTest…
F:LinRegTTest…
G:LinRegTInt…
H:ANOVA(
```

When the data is entered into the calculator, EXIT and then select [STAT] and TESTS. χ^2**GOF-TEST(** is #D on this list. Scroll up to get to the bottom of the list. The syntax for the χ^2**GOF-TEST** function is to enter the lists, the observations, followed by the expectations by their list locations, and specify the degrees of freedom. Recall that this is one less than the total number of entries in the list: here that is $5 - 1 = 4$.

Recall that to specify the lists, we press [2nd] [1] to get L_1 and [2nd] [2] for L_2. After entering the degrees of freedom, selected calculate and press [ENTER].

```
X²GOF-Test
 Observed:L₁
 Expected:L₂
 df:4
 Calculate Draw
```

```
X²GOF-Test
 X²=14.75934959
 P=.0052272723
 df=4
 CNTRB={.002743…
```

Newer calculators may also have a line for changing the color in the Draw option.

The goodness of fit test uses the χ^2-distribution. The test function calculates the p-value for you. Recall that the null hypothesis is that the data fits the distribution, whereas the alternative is that it does not fit the distribution. Compare this information to α to determine whether to accept or reject the null hypothesis H_0.

These calculations will change somewhat depending on the distribution.

χ^2**GOF-TEST**