

χ²

categorical
one variable
(many categories)

categorical
two variables
(two-way tables)

ind. random samples
or
random assignment

one random sample

χ² - Goodness of Fit (GOF)

Hypotheses:

- H₀: The population proportions are as hypothesized for all categories.
 H_a: At least one pop. prop. differs from its hyp. value.

conditions:

- The expected values are all ≥ 5 (no more than 20% < 5, no zeros)
- SRS from the population of interest

d.f. = (categ.) - 1

* data entered as lists: observed (you have to find) expected (based on hyp. prop.)

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

calculator:

χ² - GOF _{obs. L1, exp. L2} or CHI GOF Program

χ² test for homogeneity

- H₀: The pop. props. are the same for all populations.
 H_a: The pop. props. differ for at least one pop. from the others.

cond.:

- Exp. ≥ 5
- Independent random samples from the populations

OR

Random assignment to treatment groups.

expected value = $\frac{R \cdot C}{n}$

d.f. = (rows - 1)(columns - 1)
(r - 1)(c - 1)

calculator:

χ² - test uses matrices:

[A] = observed

[B] = expected → Calc. will find and store for you!

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

χ² test for independence

- H₀: The two variables are independent (no association).
 H_a: The two variables are NOT independent (there is an assoc./relationship).

cond:

- Exp. ≥ 5
- SRS from the pop. of interest