

THE CHI-SQUARE GOODNESS OF FIT TEST

Numerical Variables

can be measured

ex: weight,
height,
Blood Pressure

Categorical Variables

cannot be measured,
only categorized

EX: Gender
National Origin
Preferred Candidate

we can:
count
calculate proportions

Example 3 political candidates

$$p_1 = .35$$

$$p_2 = .30$$

$$p_3 = .20$$

Undecided
 $p_4 = .15$

T.V. Debate

Survey 500 people

One-way
 tables

①	②	③	④
$O_1 = 150$	$O_2 = 200$	$O_3 = 120$	$O_4 = 30$
$E_1 = 175$	$E_2 = 150$	$E_3 = 100$	$E_4 = 75$

$$n = 500$$

$$E_1 = p_1 \cdot n = .35 * 500 = 175$$

$$E_2 = p_2 \cdot n = .30 * 500 = 150$$

$$E_3 = p_3 \cdot n = .2 * 500 = 100$$

$$E_4 = p_4 \cdot n = .15 * 500 = 75$$

step 1

$$H_0: p_1 = .35 \quad p_2 = .30 \quad p_3 = .20 \quad p_4 = .15$$

H_a : At least one of the proportions differs from the hypothesized value

step 2

$$\text{Test statistic: } \chi^2 = \sum \frac{(O - E)^2}{E}$$

$$= \frac{(150 - 175)^2}{175} + \frac{(200 - 150)^2}{150} + \frac{(120 - 100)^2}{100} + \frac{(30 - 75)^2}{75}$$

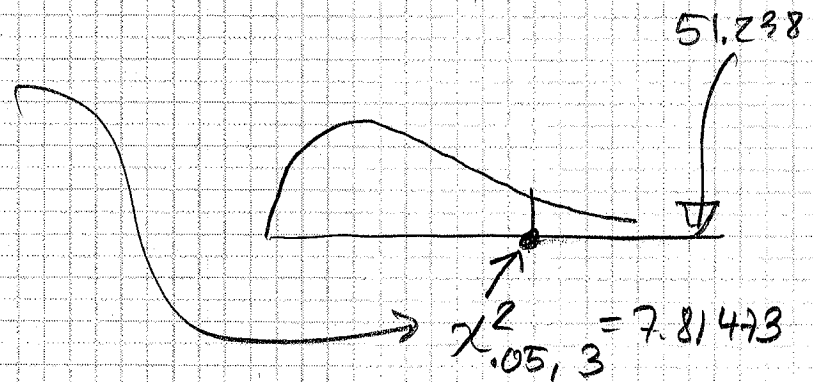
$$= 51.238$$

Step 3 Rejection Region (using the χ^2 distribution)

$$\alpha = .05$$

$$df = k - 1 = 3$$

$$RR: \chi^2 > 7.81473$$



Step 4 Decision: Reject H_0

Step 5 Conclusion: "the data provide sufficient evidence to conclude that at least one of the proportions differs from the hypothesized value."