Section 8.5: cont'd

Monday, March 26, 2018 8:30 AM

example: A researcher designs an experiment in which a rat is attracted to the end of a ramp that then divides leading to doors of three different colours. The researcher sends the rat down the ramp ninety times and observes the rat's choice as tabulated below. Does the rat have (or acquire) a preference for one of the three doors? Use a p-test to draw your conclusion.

colour	observed frequency	expected frequency
red	24	30
blue	39	30
green	27	30

H_0: rat has no preference (all probabilities equal 1/3)

H_a: rat has a preference (at least one probability ≠ 1/3)

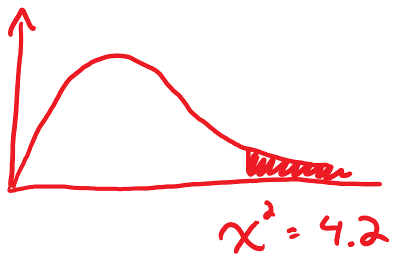
test statistic:

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

$$= \frac{(24-30)^2}{30} + \frac{(39-30)^2}{30} + \frac{(27-30)^2}{30}$$

$$= 4.2 \quad \text{with} \quad df = 2$$

p-test:



$\chi^2 = 4.2$ is between the values for $\chi^2_{0.9}$ and $\chi^2_{0.1}$

$$\underbrace{0.1 < p}_{} < 0.9$$

this is what we care about - on the significant chart, this is "not significant"

Conclusion: The rat shows no statistically significant preference for any one door.

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things to note about goodness-of-fit tests:

if your frequency table doesn't meet the requirement that at least 20% of categories are > 5, can do the following

x	f
0	18
1	25
2	14
3	6
4	4
6	4
7	0
8	1

group these

testing for independence:

contingency table:

	Gandalf	Dumbledore
Computing	77	62
English	33	28

we said that if $P(G|C) = P(G)$, then independent

but what if those probabilities are close but not identical?

answer: calculate $P(G)$, $P(D)$, $P(C)$, $P(E)$ from the data if independent,

$$P(GE) = P(G)\,P(E)$$

then use this probability to find the expected value of the table entry

then do goodness-of-fit test on four values in table vs your expected values calculated above