

GOB: review summary chart, discuss when/how to analyze residuals, Mr. Iams checks assignment 39 while you:
 Calculate the standardized residuals for A39 problems and describe (write down) what they reveal about the data.

28)

Origin	Student	Staff
American	-0.79	0.83
European	1.73	-1.89
Asian	-0.05	0.06

27)

Infection	Cranberry	Lacto-bacillus	Neither
Yes			
No			

(row tot.) (col tot.) / (grand tot.) run χ^2 test (edit) or then look at matrix B to see Exp. Values

Example 1: A group of randomly selected students from a local high school has the characteristics shown in the table. Is handedness related to eye-color?

The natural question to ask of these data is whether the chance of being right handed is independent of eye color. Recall that for events A and B to be independent, $P(A) = P(A|B)$. Here, this means the probability that a randomly selected student is right handed should not change when we learn the student's eye color. The rules for independent events are much too precise and absolute to work well with real data. We need to assess whether the observed differences in conditional distributions are greater than sampling variability reasonably allows.

Eye Color	Left	Right
Brown	6 / 7	36 / 35
Blue	7 / 5.5	26 / 27.5
Green	2 / 3.8	21 / 19.2
Other	4 / 2.7	12 / 13.3

If handedness is independent of eye color, we'd expect the proportion of right handed people to be the same for the various eye colors. This sounds a lot like the test of homogeneity. In fact, the mechanics of the calculation are identical. However here we are asking: "Are the variables independent?" rather than "Are the groups homogeneous?" So in this instance we call it a chi-square test for independence and are careful to frame our conclusions correctly. Remember, a failure of independence between two categorical variables does not show a cause-and-effect relationship between them, nor should we say that one variable depends on the other.

- A0 Data are counts.
- C0 (Are they?)
- A1 Individuals/data independent.
- C1 SRSs and $n < 10\%$ populations
- A2 Sample large enough
- C2 All expected counts ≥ 5 .

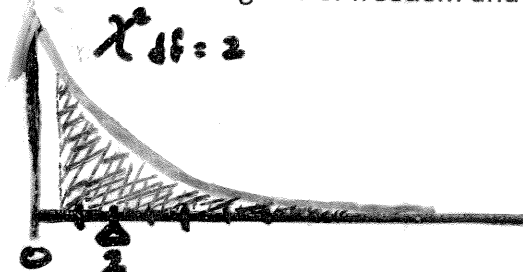
NO (green and other), so combine row

Because the A/C are met I'll use a chi-square model with 2 degrees of freedom and do a chi-square test of independence.

Eye Color	Left	Right
Brown	6	36
Blue	7	26
Other	6	33

$$\chi^2 = \sum_{\text{all cells}} \frac{(\text{Obs} - \text{Exp})^2}{\text{Exp}}$$

$$= 0.71$$



P-value = 0.70

With such a high P-value we do not reject the null hypothesis. These data do not show evidence of any association between handedness and eye color in high school students.