

Lab 10: Practice Problem 3

Consider a problem in which we observe students to see if they took notes by hand or by laptop and recorded whether they passed or failed. Of the 67 that used a laptop 44 passed. Of the 76 that wrote by hand 56 of them passed. Construct an observed and expected table. Compute the chi-squared statistic and find the p-value from the chi-squared table. Interpret your results.

$$\text{Expected cell } E_{ij} = (n_{i+} * n_{+j}) / n_{++}$$

Observed

Expected: $(67*100) / 143 = 46.85$ etc

	Pass	Fail	Total		Pass	Fail	Total
Laptop	44	23	67	Laptop	46.85	20.14	67
Hand	56	20	76	Hand	53.14	22.85	76
Total	100	43	143	Total	100	43	143

$$\chi^2 = \frac{(44 - 46.85)^2}{46.85} + \frac{(23 - 20.14)^2}{20.14} + \frac{(56 - 53.14)^2}{53.14} + \frac{(20 - 22.85)^2}{22.85}$$

$$\chi^2 = 1.087$$

$$df = 1$$

From the table, everything below 1.087 is $p = 0.701$.

Therefore p-value: $1 - 0.701 = \underline{0.299}$

There is about a 30% probability of observing such an association by chance alone. There is no statistical evidence that writing notes on a laptop or by hand impacts test performance.