

- 1) A study of “adverse symptoms” in users of over-the-counter pain relief medications assigned subjects at random to one of two common pain relievers: acetaminophen and ibuprofen. In all, 650 subjects took acetaminophen, and 44 experienced some adverse symptom. Of the 347 subjects who took ibuprofen, 49 had an adverse symptom.
 - (a) Does the data provide convincing evidence that the two pain relievers differ in the proportion of people who experience an adverse symptom? Support your conclusion with a test of significance. Use $\alpha = 0.05$.
 - (b) Find the margin of error for a 95% confidence interval for the difference in the proportions of people who experience adverse reactions to these two medications. You need not carry out all the steps in constructing a confidence interval.
- 2) A state policeman has a pet theory that people who drive red cars are more likely to drive too fast. On his day off, he borrows one of the department’s radar guns, parks his car in a rest area, and measures the proportion of red cars and non-red cars that are driving too fast. (He decides ahead of time to define “driving too fast” as exceeding the speed limit by more than 5 miles per hour). To produce a random sample, he rolls a die and only includes a car in his sample if he rolls a 5 or a 6. He finds that 18 of 28 red cars are driving too fast, and 75 of 205 other cars are driving too fast.
 - (a) Is this convincing evidence that people who drive red cars are more likely to drive too fast, as the policeman has defined it? Support your conclusion with a test of significance, using $\alpha = 0.05$.
 - (b) Construct and interpret a 95% confidence interval for the difference in proportion of red cars that drove too fast and other cars that drive too fast.
- 3) As a non-native English speaker, Sandra is convinced that people find more grammar and spelling mistakes in essays when they think the writer is a non-native English speaker. To test this, she randomly sorts a group of 40 volunteers into two groups of 20. Both groups are given the same paragraph to read. One group is told that the author of the paragraph is someone whose native language is not English. The other group is told nothing about the author. The subjects are asked to count the number of spelling and grammar mistakes in the paragraph. While the two groups found about the same number of real mistakes in the passage, the number of things that were incorrectly identified as mistakes was more interesting. Here are the results:

	Number of “mistakes” found																			
“Native English Speaker”	0	1	3	0	0	1	0	0	0	2	1	2	0	0	3	2	0	0	2	0
“Non-native English speaker”	2	1	5	0	1	4	8	7	6	0	1	0	1	4	7	4	2	1	4	5

- Do these data provide convincing evidence that readers are more likely to incorrectly identify errors in writing if they think the author’s native language is not English? Support your conclusions with an appropriate statistical test.
- 4) In many parts of the northern United States, two color variants of the Eastern Gray Squirrel—gray and black—are found in the same habitats. A scientist studying squirrels in a large forest wonders if there is a difference in the sizes of the two color variants. He collects random samples of 40 squirrels of each color from a large forest and weighs them. The 40 black squirrels have a mean weight of 20.3 ounces and a standard deviation of 2.1 ounces. The 40 gray squirrels have a mean weight of 19.2 ounces and a standard deviation of 1.9 ounces. There are no outliers in either sample. Construct and interpret a 90% confidence interval for the difference in mean weight of black and grey squirrels in this forest.