

You may work with one partner on this assignment, submitting one report with both names, provided that both students contribute substantially to the work. Word-processed reports are preferred to hand-written ones. Integrate computer output into your report as appropriate.

Cola Discrimination?

A teacher doubted whether his students could distinguish between two different brands of cola soft drink (say, Coke and Pepsi). He presented each of his 24 students with three cups of cola. Two contained the same brand, and the third contained the other brand. Each student was asked to identify the cup containing cola that differed from the other two cups.

Let π represent the probability that a student correctly identifies the “odd” brand. The hypotheses to be tested are $H_0: \pi = 1/3$ vs. $H_a: \pi > 1/3$.

a) Describe (in words) what Type I error means in this situation.

b) Describe (in words) what Type II error means in this situation.

For the remaining questions, you may use either the Power Simulation applet for an approximate answer or Minitab for an exact answer. (Include screen captures of applet results or Minitab graphs with your answers.)

c) Determine the rejection region for this test, using the $\alpha = .10$ significance level.

d) Calculate the power of this test, using the $\alpha = .10$ significance level, when the success probability is actually $\pi = .5$.

e) How would the power change if the success probability were larger? Explain why this makes sense intuitively. Then calculate the power when $\pi = 2/3$, and comment on whether this supports your answer.

f) How would the power change if the significance level were smaller? Explain why this makes sense intuitively. Then calculate the power using $\alpha = .05$ (for an alternative value of $\pi = .5$), and comment on whether this supports your answer.