

(1) Identify whether each statement about confidence intervals is true or false (no explanation is necessary).

- (a) For a given sample size, a higher confidence level means a smaller margin of error.
- (b) For a given confidence level, larger samples provide smaller margins of error.
- (c) For a given margin of error, larger samples provide greater confidence.

(2) Write the null and alternative hypotheses you would use to test each of the following situations.

- (a) Is this coin fair — that is, is it equally likely to land heads or tails?
- (b) A senator is concerned about “negatives” — the percentage of state residents who express disapproval of her job performance. Her political committee pays for a series of TV ads, hoping that they can keep the negatives below 30%. They will use follow-up polling to assess the ads’ effectiveness.
- (c) Only about 20% of those who try to quit smoking succeed. Producers of a motivational CD claim that listening to their recorded messages can help people quit.

(3) The CD producers in (2c) carry out a study to test their “quit smoking” program. They test the null hypothesis that 20% of their customers quit smoking against the alternative that more than 20% quit, and they find a p-value of .31. Which is the appropriate conclusion? (no explanation is necessary; more than one may be correct)

- (a) There’s a 31% chance that the CD worked.
- (b) There’s a 69% chance that the CD worked.
- (c) There’s a 31% chance that the study was correct.
- (d) There’s a 31% chance that the null hypothesis is true.
- (e) There’s a 31% chance that the alternative hypothesis is true.
- (f) There’s a 31% chance that random sampling variability would produce results like these if the CD doesn’t really work better than any other method.

(4a) According to one study, 21% of all college students nationwide identify themselves as politically liberal. You suspect this percentage may be different at Swarthmore. You plan a survey of first-year students to test your suspicion. What hypotheses will you test to see if Swarthmore is significantly different (higher or lower) than the national average?

(4b) From 6 years of surveying Stat 1 and 11 students, I found that 225 out of 337 students considered themselves to be liberal. (Of the others, 83 called themselves moderate, 28 conservative, and 1 anarchist.) Carry out a test of your hypotheses in part (a). Be sure to calculate the test statistic, determine the p-value, and state your conclusion.

(4c) Calculate a 95% confidence interval for the percentage of Swarthmore students who consider themselves liberal. Is your interval consistent with your hypothesis test in part (b)? Why or why not?

(4d) Is there any reason to suspect that the students surveyed may not be representative of Swarthmore students as a whole?

(5) One of the best ways to learn something is to teach it to someone else. Therefore, explain what a p-value is to your roommate, friend, family member, or someone else who hasn’t taken a Stat class. You may want to think of an example or analogy to help you explain the concept. It may be helpful to keep in mind that a p-value is a *conditional* probability. (What’s the condition?) There is nothing to hand in.