Chapter 12 Practice Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

13.33 **What's wrong with this?** For each of the following, explain what is wrong and why.

(a) A *z* statistic is used to test the null hypothesis that 1 = 2.



*H*o should refer to *p*1 and *p*2

(b) A 95% confidence interval for the difference in two proportions includes errors due to nonresponse.

Confidence intervals account only for sampling error

[13.37](JavaScript:top.OpenSupp('exercise',13,37)) **Golf club repairs** The Ping Company makes custom-built golf clubs and competes in the $4 billion golf equipment industry. To improve its business process, Ping decided to study the time it took to repair golf clubs sent to the company by mail.[28](JavaScript:top.ShowFootnote('13_28')) The company determined that 16% of orders were sent back to the customers in 5 days or less. Ping examined the processing of repair orders and made changes. Following the changes, 90% of orders were completed within 5 days. Assume that each of the estimated percents is based on a random sample of 200 orders.

(a) Construct and interpret a 95% confidence interval for the proportion of orders completed in 5 days or less before the changes. Show the formula and the substitution. How many orders would they need to sample to reduce the standard error to .02 or less?

(.1092, .2108)

(b) Do the same for the orders after the changes.

(.8584, .9416)

(c) Construct and interpret a 95% confidence interval for the improvement (new – old). Interpret the interval.

(.6743, .8057)

[13.38](JavaScript:top.OpenSupp('exercise',13,38)) **Steroids in high school** A study by the National Athletic Trainers Association surveyed 1679 high school freshmen and 1366 high school seniors in Illinois. Results showed that 34 of the freshmen and 24 of the seniors had used anabolic steroids. Steroids, which are dangerous, are sometimes used to improve athletic performance.[29](JavaScript:top.ShowFootnote('13_29'))

(a) In order to draw conclusions about all Illinois freshmen and seniors, how should the study samples be chosen?

The samples would need to be random samples of all the high school freshmen and all the high school seniors in Illinois.

(b) Construct and interpret a 95% confidence interval for the proportion of all high school freshmen in Illinois who have used steroids.

(.0135, .0270)

(c) Is there a significant difference between the proportions of freshmen and seniors who have used steroids? Justify your answer.

Using a 2-Proportion *Z* Test: *z* = .5382, *p* = .5904. Fail to Reject. It does not show a significant difference.

[13.40](JavaScript:top.OpenSupp('exercise',13,40)) **In-line skaters** A study of injuries to in-line skaters used data from the National Electronic Injury Surveillance System, which collects data from a random sample of hospital emergency rooms. In the six-month study period, 206 people came to the sample hospitals with injuries from in-line skating. We can think of these people as an SRS of all people injured while skating. Researchers were able to interview 161 of these people. Wrist injuries (mostly fractures) were the most common.[31](JavaScript:top.ShowFootnote('13_31'))

(a) The interviews found that 53 people were wearing wrist guards and 6 of these had wrist injuries. Of the 108 who did not wear wrist guards, 45 had wrist injuries. What are the two sample proportions of wrist injuries?

Injuries with Wrist guards:  Injuries without wrist guards: 

(b) Verify that we can use the z procedures in this situation.

.1132 \* 53 = 6: 6 < 10 Normal Condition is not met .4167 \* 108 = 45

(1 - .1132) \* 53 = 47 (1 - .4167) \* 108 = 63

Proceed with Caution

(c) Use a hypothesis test to determine whether there is a significant difference between the two population proportions of wrist injuries. Let α = .01. State carefully what populations your inference compares. (We would like to draw conclusions about all in-line skaters, but we have data only for injured skaters.)



*H*o: *p*1 - *p*2 = 0

*H*a: *p*1 - *p*2 ≠ 0





Reject the Null Hypothesis