AP Statistics – Unit 6 (Chapters 19-22) Extra Practice

A radio talk show host with a large audience is interested in the proportion p of adults in his listening area that think the drinking age should be lowered to 18. To find this out he poses the following question to his listeners: "Do you think that the drinking age should be reduced to 18 in light of the fact that 18-year-olds are eligible for military service?" He asks listeners to phone in and vote "yes" if they agree the drinking age should be lowered and "no" if not.

3. You are told that the proportion p of those who phoned in and answered yes is p = 0.70 and the standard error SE_p of the proportion is 0.0459. The number of people who phoned in
A) is 50   B) is 100   C) is 200   D) cannot be determined from the information given

4. Of the 100 people who phoned in 70 answered "yes." Which of the following assumptions for inference about a proportion using a confidence interval are violated?
A) The data are an SRS from the population of interest   B) The population is at least 10 times as large as the sample
C) n is so large that both the count of successes np and the count of failures $n(1 - p)$ are 10 or more
D) There appear to be no violations

After once again losing a football game to the college's arch rival, the alumni association conducted a survey to see if alumni were in favor of firing the coach. An SRS of 100 alumni from the population of all living alumni was taken. Sixty-four of the alumni in the sample were in favor of firing the coach. Let p represent the proportion of all living alumni who favor firing the coach.

11. Referring to the information above, a 95% confidence interval for p is
A) 0.64 ± 0.079 B) 0.64 ± 0.094 C) 0.64 ± 0.124 D) 0.64 ± 0.360

12. Referring to the information above, suppose you wished to see if the majority of alumni are in favor of firing the coach. To do this you test the hypotheses H_0: $p = 0.50$, H_a: $p > 0.50$ The P-value of your test is
A) between .10 and .05   B) between .05 and .01   C) between .01 and .001   D) below .001

An inspector inspects large truckloads of potatoes to determine the proportion p in the shipment with major defects prior to using the potatoes to make potato chips. Unless there is clear evidence that this proportion is less than 0.10 she will reject the shipment. To reach a decision she will test the hypotheses H_0: $p = 0.10$, H_a: $p < 0.10$ using the large sample test for a population proportion. To do so, she selects an SRS of 100 potatoes from the over 2000 potatoes on the truck. Suppose that only four of the potatoes sampled are found to have major defects.

13. Referring to the information above, the P-value of her test is
A) 0.4544   B) 0.0456   C) 0.0228   D) less than 0.0002

14. Referring to the information above, which of the following assumptions for inference about a proportion using a hypothesis test is violated?
A) The data are an SRS from the population of interest   B) The population is at least 10 times as large as the sample
C) n is so large that both np_0 and $n(1 - p_0)$ are 10 or more, where p_0 is the proportion with major defects if the null hypothesis is true.
D) There appear to be no violations.

15. A newspaper conducted a statewide survey concerning the 1998 race for governor. The newspaper took a random sample (assume it is an SRS) of 1200 registered voters and found that 640 would vote for the Democratic candidate. Is this evidence that a clear majority of the population would vote for the Democratic candidate? To answer this, test the hypotheses H_0: $p = 0.50$, H_a: $p > 0.50$ The P-value of your test is
A) 0.4920   B) 0.0330   C) 0.0104   D) less than 0.0002

19. An inspector inspects large truckloads of potatoes to determine the proportion p in the shipment with major defects prior to using the potatoes to make potato chips. She intends to compute a 95% confidence interval for p. To do so, she selects an SRS of 50 potatoes from the over 2000 potatoes on the truck. Suppose that only two of the potatoes sampled are found to have major defects. Which of the following assumptions for inference about a proportion using a confidence interval are violated?
A) The population is at least 10 times as large as the sample
B) n is so large that both the count of successes np and the count of failures $n(1 - p)$ are 10 or more
C) The population size is too small
D) There appear to be no violations

In a large Midwestern university (the class of entering freshmen being on the order of 6000 or more students), an SRS of 100 entering freshmen in 1993 found that 20 finished in the bottom third of their high school class. Admission standards at the university were tightened in 1995. In 1997 an SRS of 100 entering freshmen found that 10 finished in the bottom third of their high school class. Let p_1 and p_2 be the proportion of all entering freshmen in 1993 and 1997, respectively, who graduated in the bottom third of their high school class.

23. Referring to the information above, a 99% confidence interval for $p_1 - p_2$ is
    A) $0.10 \pm .050$ B) $0.10 \pm .083$ C) $0.10 \pm .098$ D) $0.10 \pm .129$

24. Referring to the information above, is there evidence that the proportion of freshmen who graduated in the bottom third of their high school class in 1997 has been reduced as a result of the tougher admission standards adopted in 1995, compared to the proportion in 1993? To determine this, you test the hypotheses $H_0: p_1 = p_2$, $H_a: p_1 > p_2$. The P-value of your test is
    A) between .10 and .05   B) between .05 and .01   C) between .01 and .001   D) below .001

An SRS of 100 flights of a large airline (call this airline 1) showed that 64 were on time. An SRS of 100 flights of another large airline (call this airline 2) showed that 80 were on time. Let p_1 and p_2 be the proportion of all flights that are on time for these two airlines.

26. Referring to the information above, a 95% confidence interval for the difference $p_1 - p_2$ is
    A) -0.16 ± 0.062 B) -0.16 ± 0.122 C) -0.16 ± 0.103 D) 0.16 ± 0.062

27. Referring to the information above, is there evidence of a difference in the on-time rate for the two airlines? To determine this, you test the hypotheses $H_0: p_1 = p_2$, $H_a: p_1 \neq p_2$. The P-value of your test of the hypotheses given is
    A) between .10 and .05   B) between .05 and .01   C) between .01 and .001   D) below .001

An agricultural researcher wishes to see if a kelp extract helps prevent frost damage on tomato plants. Two similar small plots are planted with the same variety of tomato. Plants in both plots are treated identically, except the plants on plot 1 are sprayed weekly with a kelp extract while the plants on plot 2 are not. After the first frost in the autumn, the percentage of damaged fruit is determined. For plants in plot 1, 20 of the 100 tomatoes on the vine exhibited damage. For plants in plot 2, 36 of the 100 tomatoes on the vine showed damage. Let p_1 and p_2 be the actual proportion of all tomatoes of this variety that would experience crop damage under the kelp and no kelp treatments, respectively, when grown under conditions similar to those in the experiment.

28. Referring to the information above, a 99% confidence interval for $p_1 - p_2$ is
    A) $-.16 \pm 0.062$ B) $-.16 \pm 0.122$ C) $-.16 \pm 0.161$ D) $.16 \pm 0.062$

29. Referring to the information above, is there evidence of a decrease in the proportion of tomatoes suffering frost damage for tomatoes sprayed with kelp extract? To determine this, you test the hypotheses $H_0: p_1 = p_2$, $H_a: p_1 < p_2$. The P-value of your test is
    A) between .10 and .05   B) between .05 and .01   C) between .01 and .001   D) below .001

A sociologist is studying the effect of having children within the first three years of marriage on the divorce rate. From city marriage records she selects a random sample of 400 couples that were married between 1985 and 1990 for the first time, with both members of the couple between the ages of 20 and 25. Of the 400 couples, 220 had at least one child within the first three years of marriage. Of the couples that had children, 83 were divorced within five years, while in the couples that didn't have children only 52 were divorced within three years. Suppose p_1 is the proportion of couples married in this time frame that had a child within the first three years and were divorced within five years and p_2 is the proportion of couples married in this time frame that did not have a child within the first two years and were divorced within five years.

32. Referring to the information above, the estimate of $p_1 - p_2$ is
    A) 0.0884   B) 0.3100   C) 0.3375   D) 0.3773

33. Referring to the information above, the sociologist had hypothesized that having children early would increase the divorce rate. She tested the one-sided alternative and obtained a P-value of 0.0314. The correct conclusion is that
    A) if you want to decrease your chances of getting divorced, it is best to wait several years before having children
    B) there is evidence of an association between divorce rate and having children early
    C) if you want to decrease your chances of getting divorced, it is best not to marry when you are closer to 30 years old
    D) it is best not to have children

Answer Key

3. B	12. C	15. C	24. B	28. C	33. B
4. A	13. C	19. B	26. B	29. C	
11. B	14. D	23. D	27. B	32. A	