QUIZ 11.1 - AP STATS

NAME

PERIOD

Multiple choice: Select the best answer for Exercises 29 to 32.

A sample survey interviews SRSs of 500 female college students and 550 male college students. Each student is asked whether he or she worked for pay last summer. In all, 410 of the women and 484 of the men say "Yes." Exercises 29 to 31 are based on this survey.

SRS $n_F = 500$ $x_F = 410$ $\hat{p}_F = .82$

SRS $n_m = 550$ $x_M = 484$ $\hat{p}_M = .88$

29. Take p_M and p_F to be the proportions of all college males and females who worked last summer. We conjectured before seeing the data that men are more likely to work. The hypotheses to be tested are
    (a) $H_0: p_M - p_F = 0$ versus $H_a: p_M - p_F \neq 0$.
    (b) $H_0: p_M - p_F = 0$ versus $H_a: p_M - p_F > 0$.
    (c) $H_0: p_M - p_F = 0$ versus $H_a: p_M - p_F < 0$.
    (d) $H_0: \cancel{p_M - p_F >} 0$ versus $H_a: p_M - p_F = 0$.
    (e) $H_0: \cancel{p_M - p_F \neq} 0$ versus $H_a: p_M - p_F = 0$.

$H_0: P_m - P_F = 0$

$H_A: P_m > P_F$

30. The pooled sample proportion who worked last summer is about
    (a) $\hat{p}_C = 1.70$.
    (b) $\hat{p}_C = 0.89$.
    (c) $\hat{p}_C = 0.88$.
    (d) $\hat{p}_C = 0.85$.
    (e) $\hat{p}_C = 0.82$.

$$\hat{P}_C = \frac{x_1 + x_2}{n_1 + n_2} = \frac{410 + 484}{500 + 550} = \frac{894}{1050} = .85$$

31. The 95% confidence interval for the difference $p_M - p_F$ in the proportions of college men and women who worked last summer is about
    (a) 0.06 ± 0.00095.
    (b) 0.06 ± 0.043.
    (c) ~~0.06 ± 0.036.~~
    (d) ~~-0.06 ± 0.043.~~
    (e) ~~-0.06 ± 0.036.~~

$P_m - P_F$ STAT TESTS > 2PROPZINT

$.88 - .82 = \underline{.06}$

$(.01674, .10326)$

$$\frac{.10326 - .01674}{2} = .043$$

mE

OR

$$.88 - .82 \pm 1.96\sqrt{\frac{.82(.18)}{500} + \frac{.88(.12)}{550}} = \boxed{.06 \pm .043}$$

32. In an experiment to learn whether Substance M can help restore memory, the brains of 20 rats were treated to damage their memories. The rats were trained to run a maze. After a day, 10 rats (determined at random) were given M and 7 of them succeeded in the maze. Only 2 of the 10 control rats were successful. The two-sample z test for "no difference" against "a significantly higher proportion of the M group succeeds"
    (a) gives $z = 2.25$, $P < 0.02$.
    (b) gives $z = 2.60$, $P < 0.005$.
    (c) gives $z = 2.25$, $P < 0.04$ but not < 0.02.
    (d) should not be used because the Random condition ~~is violated~~. Rats randomly assigned
    (e) should not be used because the Normal condition is violated.

$n_1 = 10$ $x_1 = 7$ $\hat{p}_1 = .7$ $n_1 p_1 = 7 > 10$ X

$n_2 = 10$ $x_2 = 2$ $\hat{p}_2 = .2$ $n_2 p_2 = 2 > 2$ X

Quiz 11.2 – AP STATS

NAME ______________________

PERIOD ____________

Multiple choice: Select the best answer for Exercises 67–70.

67. One major reason that the two-sample t procedures are widely used is that they are quite *robust*. This means that

(a) t procedures do not require that we know the standard deviations of the populations. T | but not definition of Robust

(b) t procedures work even when the Random, Normal, and Independent conditions are violated. F

(c) ~~t procedures compare population means,~~ a comparison that answers many practical questions.

(d) confidence levels and P-values from the t procedures are quite accurate even if the population distribution is not exactly Normal. ← Robust nature of t-test

(e) confidence levels and P-values from the t procedures are quite accurate even if outliers and strong skewness are present.

68. There are two common methods for measuring the concentration of a pollutant in fish tissue. Do the two methods differ on the average? You apply both methods to a random sample of 18 carp and use

(a) the paired t test for μ_d. ← Applying both treatments to the same population.

(b) the one-sample z test for p.

(c) the two-sample t test for $\mu_1 - \mu_2$.

(d) the two-sample z test for $p_1 - p_2$.

(e) none of these.

Exercises 69 and 70 refer to the following setting. A study of road rage asked samples of 596 men and 523 women about their behavior while driving. Based on their answers, each person was assigned a road rage score on a scale of 0 to 20. The participants were chosen by random digit dialing of telephone numbers.

69. We suspect that men are more prone to road rage than women. To see if this is true, test these hypotheses for the mean road rage scores of all male and female drivers: $\boxed{P_m > P_w}$

(a) $H_0: \mu_M = \mu_F$ versus $H_a: \mu_M > \mu_F$.

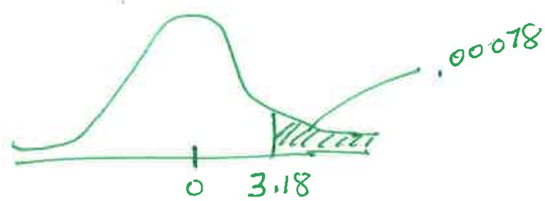
(b) $H_0: \mu_M = \mu_F$ versus $H_a: \mu_M \neq \mu_F$.

(c) $H_0: \mu_M = \mu_F$ versus $H_a: \mu_M < \mu_F$.

(d) $\cancel{H_0: \bar{x}_M = \bar{x}_F \text{ versus } H_a: \bar{x}_M} > \bar{x}_F$.

(e) $\cancel{H_0: \bar{x}_M = \bar{x}_F}$ versus $H_a: \bar{x}_M < \bar{x}_F$.

MUST USE POPULATION PARAMETERS IN TOH



70. The two-sample t statistic for the road rage study (male mean minus female mean) is $t = 3.18$. The P-value for testing the hypotheses from the previous exercise satisfies

(a) $0.001 < P < 0.005$.
(b) $0.0005 < P < 0.001$.
(c) $0.001 < P < 0.002$.
(d) $0.002 < P < 0.01$.
(e) $P > 0.01$.

tcdf (3.18, E99, $\overset{DF}{522}$) = 7.8 E^{-4}

.0005 < .00078 < .001

USE THE CONSERVATIVE DF

df = smaller sample size − 1

= 523 − 1 = 522

Chapter 10 Quiz – AP STATS

NAME

Period

T10.1. A study of road rage asked separate random samples of 596 men and 523 women about their behavior while driving. Based on their answers, each respondent was assigned a road rage score on a scale of 0 to 20. Are the conditions for performing a two-sample t test satisfied?

(a) Maybe; we have independent random samples, but we need to look at the data to check Normality. CLT $n > 30$

(b) No; road rage scores in a range between 0 and 20 can't be Normal.

use t stat

(c) ~~No,~~ we don't know the population standard deviations.

(d) Yes; the large sample sizes ~~guarantee~~ that the corresponding population distributions will be Normal.

(e) Yes; we have two independent random samples and large sample sizes. → ~Normal (meet 3 conditions)

T10.2. Thirty-five people from a random sample of 125 workers from Company A admitted to using sick leave when they weren't really ill. Seventeen employees from a random sample of 68 workers from Company B admitted that they had used sick leave when they weren't ill. A 95% confidence interval for the difference in the proportions of workers at the two companies who would admit to using sick leave when they weren't ill is

$z^* = 1.96$

A: $\hat{p} = \frac{35}{125} = .28$

B: $\hat{p} = \frac{17}{68} = .25$

(a) $0.03 \pm \sqrt{\frac{(0.28)(0.72)}{125} + \frac{(0.25)(0.75)}{68}}$

(b) $0.03 \pm 1.96\sqrt{\frac{(0.28)(0.72)}{125} + \frac{(0.25)(0.75)}{68}}$

(c) $0.03 \pm 1.645\sqrt{\frac{(0.28)(0.72)}{125} + \frac{(0.25)(0.75)}{68}}$

(d) $0.03 \pm 1.96\sqrt{\frac{(0.269)(0.731)}{125} + \frac{(0.269)(0.731)}{68}}$

(e) $0.03 \pm 1.645\sqrt{\frac{(0.269)(0.731)}{125} + \frac{(0.269)(0.731)}{68}}$

SKIP

T10.3. The power takeoff driveline on tractors used in agriculture is a potentially serious hazard to operators of farm equipment. The driveline is covered by a shield in new tractors, but for a variety of reasons, the shield is often missing on older tractors. Two types of shields are the bolt-on and the flip-up. It was believed that the bolt-on shield was perceived as a nuisance by the operators and deliberately removed, but the flip-up shield is easily lifted for inspection and maintenance and may be left in place. In a study initiated by the U.S. National Safety Council, random samples of older tractors with both types of shields were taken to see what proportion of shields were removed. Of 183 tractors designed to have bolt-on shields, 35 had been removed. Of the 136 tractors with flip-up shields, 15 were removed. We wish to perform a test of $H_0: p_b = p_f$ versus $H_a: p_b \neq p_f$ where p_b and p_f are the proportions of all tractors with the bolt-on and flip-up shields removed, respectively. Which of the following conditions for performing the appropriate significance test is *definitely not* satisfied in this case?

(a) Both populations are Normally distributed.

(b) The data come from two independent samples.

(c) Both samples were chosen at random. Yes - both SRS's

(d) The counts of successes and failures are large enough to use Normal calculations.

(e) Both populations are at least 10 times the corresponding sample sizes. ✓ Satisfied

The variable being measures is a yes/no variable, so the population cannot be normal.

T10.4 A quiz question gives random samples of $n = 10$ observations from each of two Normally distributed populations. Tom uses a table of t distribution critical values and 9 degrees of freedom to calculate a 95% confidence interval for the difference in the two population means. Janelle uses her calculator's two-sample t interval with 16.87 degrees of freedom to compute the 95% confidence interval. Assume that both students calculate the intervals correctly. Which of the following is true?

Tom uses the more conservative approach which gives a wider C.I.

(a) Tom's confidence interval is wider.

(b) Janelle's confidence interval is wider.

(c) Both confidence intervals are the same.

(d) There is insufficient information to determine which confidence interval is wider.

(e) Janelle made a mistake; degrees of freedom has to be a whole number.

~~Exercises T10.5 and T10.6 refer to the following setting.~~ A researcher wished to compare the average amount of time spent in extracurricular activities by high school students in a suburban school district with that in a school district of a large city. The researcher obtained an SRS of 60 high school students in a large suburban school district and found the mean time spent in extracurricular activities per week to be 6 hours with a standard deviation of 3 hours. The researcher also obtained an independent SRS of 40 high school students in a large city school district and found the mean time spent in extracurricular activities per week to be 5 hours with a standard deviation of 2 hours. Suppose that the researcher decides to carry out a significance test of $H_0: \mu_{suburban} = \mu_{city}$ versus a two-sided alternative.

T10.5. The correct test statistic is

(a) $t = \frac{(6-5)-0}{\sqrt{\frac{3^2}{60} + \frac{2^2}{40}}}$

(b) $t = \frac{(6-5)-0}{\sqrt{\frac{3^2}{60} + \frac{2^2}{40}}}$

(c) $t = \frac{(6-5)-0}{\sqrt{\frac{9}{60} + \frac{3}{40}}}$

(d) $\cancel{z} = \frac{(6-5)-0}{\sqrt{\frac{3}{60} + \frac{2}{40}}}$

(e) $\cancel{z} = \frac{(6-5)-0}{\sqrt{\frac{3^2}{60} + \frac{2^2}{40}}}$

Do NOT KNOW σ pop S.D.

T10.6. The P-value for the test is 0.048. A correct conclusion is to

(a) fail to reject H_0 at the $\alpha = 0.05$ level. There is convincing evidence of a difference in the average time spent on extracurricular activities by students in the suburban and city school districts.

(b) fail to reject H_0 at the $\alpha = 0.05$ level. There is not convincing evidence of a difference in the average time spent on extracurricular activities by students in the suburban and city school districts.

(c) fail to reject H_0 at the $\alpha = 0.05$ level. There is convincing evidence that the average time spent on extracurricular activities by students in the suburban and city school districts is the same.

(d) reject H_0 at the $\alpha = 0.05$ level. There is not convincing evidence of a difference in the average time spent on extracurricular activities by students in the suburban and city school districts.

(e) reject H_0 at the $\alpha = 0.05$ level. There is convincing evidence of a difference in the average time spent on extracurricular activities by students in the suburban and city school districts.

small pvalue → Reject Ho

larg pvalue → FAIL TO Reject Ho

T10.7. At a baseball game, 42 of 65 randomly selected people report owning an iPod. At a rock concert occurring at the same time across town, 34 of 52 randomly selected people report owning an iPod. A researcher wants to test the claim that the proportion of iPod owners at the two venues is different. A 90% confidence interval for the difference in population proportions is $(-0.154, 0.138)$. Which of the following gives the correct outcome of the researcher's test of the claim?

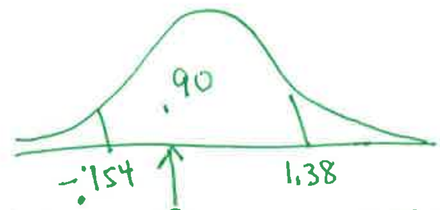
(a) Since the confidence interval includes 0, the researcher can conclude that the proportion of iPod owners at the two venues is the same.

(b) Since the confidence interval includes 0, the researcher can conclude that the proportion of iPod owners at the two venues is different.

(c) Since the confidence interval includes 0, the researcher cannot conclude that the proportion of iPod owners at the two venues is different.

(d) Since the confidence interval includes more negative than positive values, the researcher can conclude that a higher proportion of people at the rock concert own iPods than at the baseball game.

(e) The researcher cannot draw a conclusion about a claim without performing a significance test.



0 include in CI → fail to reject

T10.8. An SRS of size 100 is taken from Population A with proportion 0.8 of successes. An independent SRS of size 400 is taken from Population B with proportion 0.5 of successes. The sampling distribution for the difference (Population A – Population B) in sample proportions has what mean and standard deviation?

$\mu_{\hat{p}_A - \hat{p}_B} = .8 - .5 = .3$

$\sigma = \sqrt{\frac{.8(.2)}{100} + \frac{.5(.5)}{400}} = .047$

(a) mean = 0.3; standard deviation = 1.3

(b) mean = 0.3; standard deviation = 0.40

(c) mean = 0.3; standard deviation = 0.047

(d) mean = −0.3; standard deviation = 0.047

(e) mean = 0.3; standard deviation = 0.0002

T10.9. How much more effective is exercise and drug treatment than drug treatment alone at reducing the rate of heart attacks among men aged 65 and older? To find out, researchers perform a completely randomized experiment involving 1000 healthy males in this age group. Half of the subjects are assigned to receive drug treatment only, while the other half are assigned to exercise regularly and to receive drug treatment. The most appropriate inference method for answering the original research question is

(a) one-sample z test for a proportion.

(b) two-sample z interval for $p_1 - p_2$.

(c) two-sample z test for $p_1 - p_2$.

(d) two-sample t interval for $\mu_1 - \mu_2$.

(e) two-sample t test for $\mu_1 - \mu_2$.

- NOT TESTING A CLAIM SO NOT A TEST
- The statistic is proportions

SKIP

T10.10. Researchers are interested in evaluating the effect of a natural product on reducing blood pressure. This will be done by comparing the mean reduction in blood pressure of a treatment (natural product) group and a placebo group using a two-sample t test. The researchers would like to be able to detect whether the natural product reduces blood pressure by at least 7 points more, on average, than the placebo. If groups of size 50 are used in the experiment, a two-sample t test using $\alpha = 0.01$ will have a power of 80% to detect a 7-point difference in mean blood pressure reduction. If the researchers want to be able to detect a 5-point difference instead, then the power of the test

Question Asked

(a) would be less than 80%.

(b) would be greater than 80%.

(c) would still be 80%. No

(d) could be either less than or greater than 80%, depending on whether the natural product is effective. NO

(e) would vary depending on the standard deviation of the data. NO