

Student: _____
Date: _____
Time: _____

Instructor: Darryl Allen
Course: Elementary Statistics 60157
Book: Triola: Elementary Statistics, 11e

Assignment: Ch 9 Practice Exam A

1. Researchers conducted an experiment to test the effects of alcohol. The errors were recorded in a test of visual and motor skills for a treatment group of 22 people who drank ethanol and another group of 22 people given a placebo. The errors for the treatment group have a standard deviation of 1.79, and the errors for the placebo group have a standard deviation of 1.45. Use a 0.05 significance level to test the claim that the treatment group has errors that vary more than the errors of the placebo group. (Assume that both samples are independent simple random samples from populations having normal distributions.)

What is the conclusion for this hypothesis test?

- A. Fail to reject H_0 . There is sufficient evidence to support the claim that the treatment group has errors that vary more than the errors of the placebo group.
- B. Reject H_0 . There is insufficient evidence to support the claim that the treatment group has errors that vary more than the errors of the placebo group.
- C. Reject H_0 . There is sufficient evidence to support the claim that the treatment group has errors that vary more than the errors of the placebo group.
- D. Fail to reject H_0 . There is insufficient evidence to support the claim that the treatment group has errors that vary more than the errors of the placebo group.

2. In a 1993 survey of 560 college students, 172 said that they used illegal drugs during the previous year. In a recent survey of 720 college students, 248 said that they used illegal drugs during the previous year. Use a 0.05 significance level to test the claim that the proportion of college students using illegal drugs in 1993 was less than it is now.

Since the P-value is the significance level of $\alpha = 0.05$, there is evidence to support the claim that the proportion of college students using illegal drugs in 1993 was less than it is now.

3. Assume that the paired data came from a population that is normally distributed. Using a 0.05 significance level, find \bar{d} , s_d , the t test statistic, and the critical values to test the claim that $\mu_d = 0$.

x_i	17	15	7	12	14	3	13	2	
y_i	14.0	14.0	8.0	9.0	15.0	8.0	12.0	5.0	

$\bar{d} =$ (Round to three decimal places as needed.)

$s_d =$ (Round to three decimal places as needed.)

$t =$ (Round to three decimal places as needed.)

$t_{\alpha/2} = \pm$ (Round to three decimal places as needed.)

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4. Using the data below and a 0.1 significance level, test the claim that the mean amount of tar in filtered cigarettes is less than the mean amount of tar in unfiltered cigarettes. Do not assume the population standard deviations are equal. All measurements are in milligrams.

Filtered	18	17	15	15	17	3	16	19	8	16	12
Unfiltered	23	20	22	24	24	26	19	22			

Is there sufficient evidence to support the claim that the mean amount of tar in filtered cigarettes is less than the mean amount of tar in unfiltered cigarettes?

- A. Yes, because the null hypothesis is rejected.
 B. No, because the null hypothesis is not rejected.
 C. Yes, because the null hypothesis is not rejected.
 D. No, because the null hypothesis is rejected.

5. Use a 0.05 significance level to test the claim that the two sodas have weights with different standard deviations. Assume that the populations are normally distributed.

	n	\bar{x}	s
soda x	41	0.786821	0.004391
soda y	9	0.786834	0.004309

Is there sufficient evidence to reject the null hypothesis?

- A. Yes, because the test statistic did not fall in the critical region.
 B. Yes, because the test statistic fell in the critical region.
 C. No, because the test statistic did not fall in the critical region.
 D. No, because the test statistic fell in the critical region.

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6. A study was done testing a new drug to treat psychiatric disorders. The results are shown in the table. Construct a 95% confidence interval for the difference between the two population means. Do not assume the population standard deviations are equal. Based on the results, does it appear that the two populations have different means?

	Treatment	Placebo
n	27	40
\bar{x}	19.77	18.72
s	3.58	3.53

Find the 95% confidence interval.

< $\mu_1 - \mu_2$ < (Round to three decimal places as needed.)

Does the confidence interval show that the treatment makes a difference?

- A. Yes, because the confidence interval does not include zero.
 B. No, because the confidence interval does not include zero.
 C. Yes, because the confidence interval includes zero.
 D. No, because the confidence interval includes zero.

7. In randomized, double-blind clinical trials of a new vaccine, subjects were randomly divided into two groups. Subjects in group 1 received the new vaccine while subjects in group 2 received a control vaccine. After the first dose, 116 of 725 subjects in the experimental group (group 1) experienced vomiting as a side effect. After the first dose, 69 of 636 of the subjects in the control group (group 2) experienced vomiting as a side effect. Construct a 95% confidence interval for the difference between the two population proportions, $p_1 - p_2$.

Construct a 95% confidence interval estimate.

< $p_1 - p_2$ < (Round to three decimal places as needed.)

8. In a clinical trial of a drug, 2.1% of the 1645 treated subjects experienced blurred vision. Among the 1655 subjects given placebos, 1.9% experienced blurred vision. Use a 0.01 significance level to test the claim that the incidence of blurred vision is greater among those who use the drug.

What is the conclusion of the hypothesis test?

- A. There is not sufficient evidence to support the claim that the incidence of blurred vision is greater among those who use the drug.
 B. There is sufficient evidence to support the claim that the incidence of blurred vision is less among those who use the drug.
 C. There is sufficient evidence to support the claim that the incidence of blurred vision is greater among those who use the drug.
 D. There is not sufficient evidence to support the claim that the incidence of blurred vision is less among those who use the drug.

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9. Scientists collect a simple random sample of 25 menthol cigarettes and 25 nonmenthol cigarettes. The menthol cigarettes have a mean nicotine amount of 0.81 mg and a standard deviation of 0.26 mg. The nonmenthol cigarettes have a mean nicotine amount of 0.98 mg and a standard deviation of 0.26 mg. Use a 0.05 significance level to test the claim that menthol cigarettes and nonmenthol cigarettes have different amounts of nicotine. Does menthol appear to have an affect on the nicotine content? Assume that the two samples are independent simple random samples selected from normally distributed populations. Do not assume that the population standard deviations are equal.

H₀. There sufficient evidence that the menthol cigarettes and nonmenthol cigarettes have different amounts of nicotine.

Does menthol appear to have an affect on the nicotine content?

, menthol appear to have an affect on the nicotine content.

10. Among 2650 randomly selected male car occupants over the age of 8, 72% wear seatbelts. Among 2850 randomly selected female car occupants over the age of 8, 74% wear seat belts. Use a 0.01 significance level to test the claim that both genders have the same rate of seat belt use. Does there appear to be a gender gap?

Does there appear to be a gender gap?

- A. There appears to be a gender gap because there is a significant difference in the proportions.
 B. There does not appear to be a gender gap because there is a significant difference in the proportions.
 C. There does not appear to be a gender gap because there is not a significant difference in the proportions.
 D. There appears to be a gender gap because there is not a significant difference in the proportions.

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11. Listed below are amounts of strontium-90 (in millibecquerels or mBq per gram of calcium) in a simple random sample of baby teeth obtained from residents of state A and state B. Use a 0.05 significance level to test the claim that amounts of Strontium-90 from state A residents vary more than amounts from state B residents. (Assume that both samples are independent simple random samples from populations having normal distributions.)

 Click the icon to view the sample data.

What is the conclusion for this hypothesis test?

- A. Reject H_0 . There is sufficient evidence to support the claim that amounts of Strontium-90 from state A residents vary more than amounts from state B residents.
- B. Reject H_0 . There is insufficient evidence to support the claim that amounts of Strontium-90 from state A residents vary more than amounts from state B residents.
- C. Fail to reject H_0 . There is sufficient evidence to support the claim that amounts of Strontium-90 from state A residents vary more than amounts from state B residents.
- D. Fail to reject H_0 . There is insufficient evidence to support the claim that amounts of Strontium-90 from state A residents vary more than amounts from state B residents.

Sample data


State A: 139 141 148 154 151 139 152 149 155 150 138 143

State B: 135 140 142 130 135 129 127 140 130 140 138 143

12. In a survey, 29% of 230 single women said that they "definitely want to have children." In the same survey, 27% of 260 single men gave the same response. Construct a 90% confidence interval estimate of the difference between the proportions of single women and single men who definitely want to have children. Is there a gender gap?

Construct a 90% confidence interval estimate.

< $p_1 - p_2$ < (Round to three decimal places as needed.)

Is there a gender gap? Choose the correct answer below.

- A. Since the interval does not contain 0, there is evidence of a gender gap.
- B. Since the interval contains 0, there is no evidence of a gender gap.
- C. Since the interval contains 0, there is evidence of a gender gap.
- D. Since the interval does not contain 0, there is no evidence of a gender gap.

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13. A student surveyed her friends and found that among 20 males, 4 smoke, and among 30 female friends, 6 smoke. Give *two* reasons why these results should not be used for a hypothesis test of the claim that the proportions of male smokers and female smokers are equal.

Choose the correct answer below.

- A. 1. The sample is a convenience sample.
2. There are less than 5 successes or 5 failures for the males.
- B. 1. The sample is a voluntary response sample.
2. There are less than 5 successes or 5 failures for the females.
- C. 1. The sample is a voluntary response sample.
2. There are less than 5 successes or 5 failures for the males.
- D. 1. The sample is a convenience sample.
2. There are less than 5 successes or 5 failures for the females.

14. The effectiveness of treating respiratory infections with herbal remedies was studied. "Days of fever" was used to measure effects. Among 449 children treated with herbal remedies, the mean number of days with fever was 0.35, with a standard deviation of 1.39 days. Among 448 children given a placebo, the mean was 0.93, with a standard deviation of 1.25 days. Use a 0.05 significance level to test the claim that herbal remedies affect the number of days with fever. Do not assume the population standard deviations are equal. Based on these results, do herbal remedies appear to be effective?

Choose the correct answer below.

- A. Yes, because the null hypothesis is not rejected.
- B. No, because the null hypothesis is rejected.
- C. No, because the null hypothesis is not rejected.
- D. Yes, because the null hypothesis is rejected.

15. A simple random sample of the cents portions from 100 checks and from 100 credit card charges were collected. The cents portions of the checks have a mean of 21.6 cents and a standard deviation of 34.0 cents. The cents portion of the credit charges have a mean of 25.8 cents and a standard deviation of 32.5 cents. Use a 0.10 significance level to test the claim that the cents portions of the check amounts have a mean that is less than the mean of the cents portions of the credit card charges. Assume that the two samples are independent simple random samples selected from normally distributed populations. Do not assume that the population standard deviations are equal.

H_0 . There sufficient evidence that the cents portions of the check amounts have a mean that is less than the mean of the cents portions of the credit card charges.

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16. Refer to the data set in the accompanying table. Assume that the paired sample data is a simple random sample and the differences have a distribution that is approximately normal. Construct a 95% confidence interval estimate of the mean of the differences between weights of discarded paper (in pounds) and weights of discarded plastic (in pounds). Which seems to weigh more, discarded paper or discarded plastic?

 Click the icon to view the data.

Let μ_1 be the mean of the weights of discarded paper, μ_2 be the mean of the weights of discarded plastic, and $\mu_d = \mu_1 - \mu_2$.

The 95% confidence interval is $\square < \mu_d < \square$.
(Round to three decimal places as needed.)

Which seems to weigh more, discarded paper or discarded plastic?

- A. Discarded paper appears to weigh more because the confidence interval does not contain the value 0 lbs and the estimates of the mean differences are positive.
- B. Discarded plastic appears to weigh more because the confidence interval does not contain the value 0 lbs and the estimates of the mean differences are negative.
- C. They appear to weigh about the same because the confidence interval contains the value 0 lbs.
- D. Discarded paper appears to weigh more because the confidence interval contains the value 0 lbs.

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16. Household Paper Plastic 

(cont.)

1	20.12	4.37
2	8.82	2.83
3	3.27	0.15
4	13.61	2.13
5	13.05	2.93
6	7.57	1.41
7	9.41	0.80
8	16.08	3.42
9	6.33	0.92
10	14.33	1.53
11	15.09	2.17
12	17.65	2.68
13	6.05	0.65
14	7.72	0.92
15	11.08	2.97
16	6.16	1.40
17	6.98	0.63
18	6.38	2.10
19	12.73	3.53
20	9.83	1.49
21	9.55	2.19
22	16.39	2.31
23	13.31	4.69
24	12.32	2.66
25	9.45	0.72
26	2.80	1.41
27	6.83	0.85
28	5.86	0.93
29	7.98	1.45
30	6.96	1.81

17. If you want to construct a confidence interval to be used for testing the claim that college students have a mean IQ score that is greater than 100, and you want the test conducted with a 0.01 significance level, what confidence level should be used for the confidence interval?

Choose the correct answer below.

- A. 95% or 0.95
 B. 99% or 0.99
 C. 90% or 0.90
 D. 98% or 0.98

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18. Assume you plan to construct a 95% confidence interval. The numbers of online applications from simple random samples of college applications for 2003 and for the current year are given below. Find (a) the margin of error E, and (b) the 95% confidence interval.

	2003	Current Year
Number of applications in sample	31	28
Number of online applications in sample	10	14

a. The margin of error is . (Round to five decimal places as needed.)

b. Let p_1 be the proportion of online applications for 2003 and p_2 be the proportion of online applications for the current year. Find the 95% confidence interval estimate of the difference in proportions, $p_1 - p_2$.

< $p_1 - p_2$ <

(Round to four decimal places as needed.)

19. The data below are yields for two different types of corn seed that were used on adjacent plots of land.

Type 1	2045	2084	2119	2434	2222	2073	2235	1464	
Type 2	2049.0	1976.0	2023.0	2407.0	2187.0	1961.0	2193.0	1401.0	

a. Using a 0.05 significance level, test the claim that there is no difference between the yields of the two types of seed. Do they appear to have different yields?

- A. Yes, because the null hypothesis is rejected.
 B. No, because the null hypothesis is rejected.
 C. No, because the null hypothesis is not rejected.
 D. Yes, because the null hypothesis is not rejected.

b. Construct a 95% confidence interval for the mean difference between the yields from the two different types of seed.

< μ_d < (Round to two decimal places as needed.)

c. Does it appear that either type of seed is better?

- A. Yes, because the confidence interval does not include zero and the null hypothesis is rejected.
 B. No, because the confidence interval includes zero and the null hypothesis is not rejected.
 C. Yes, because the confidence interval includes zero and the null hypothesis is not rejected.
 D. No, because the confidence interval does not include zero and the null hypothesis is rejected.

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20. Listed below are ages of actresses and actors from a country at the times that they won a certain award. The data are paired according to the years that they won. Use a 0.01 significance level to test the belief that best actresses are younger than best actors. Does the result suggest a problem in that culture? Assume that the paired sample data is a simple random sample and that the differences have a distribution that is approximately normal.

Best Actresses 24 27 36 25 42 27 41 21 39 28 29 40 39 33 32 
Best Actors 40 41 28 56 56 48 39 62 39 62 41 49 36 42 41

Since the test statistic in the critical region, H_0 . There is evidence to support the belief that best actresses are younger than best actors. This result suggests that there a problem in that culture.

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1. D

2. greater than
insufficient

3. - 0.25
2.816
- 0.251
2.365

4. A

5. C

6. - 0.773
2.873
D

7. 0.016
0.088

8. A

9. Reject
is
Yes
does

10. C

11. D

12. - 0.047
0.087
B

13. A

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14. D

15. Fail to reject
is not

16. 6.843
9.535
A

17. D

18. 0.24775
- 0.4252
0.0703

19. A
24.62
95.13
A

20. falls
reject
sufficient
is
