

## DIRECTIONS:

- Write answers to hypothesis tests using the **Four Steps format** shown on p. 27 in the Notes. Use significance level  $\alpha = 5\%$  whenever the text does not specify  $\alpha$ .
  - Data sets are posted on the course website for some textbook exercises. These save time and effort over typing data directly into MINITAB worksheets.
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A. Using **MINITAB** Data Files in Virtual Desktop. (Follow the steps below.)

1. Log on to Virtual Desktop:

`http://virtualdesktop.uiowa.edu`

2. To open the MINITAB data file `Topic 4 Example 1` from the course website, use

Web Browsers > Firefox  
> Open Course Website (it may be easiest to google "Blake Whitten")  
> Go to MINITAB Data Sets page, click the file

3. Look back at the Topic 4 Example 1 Notes. Use MINITAB steps

Stat > Tables > Chi-Square Test

to reproduce the results for Example 1.

4. Answer the following questions:

- (a) Find MINITAB's exact  $\chi^2$  statistic.
- (b) Find MINITAB's  $P$ -value.
- (c) Complete the Decision in Step 3: Is  $H_0$  rejected? Why or why not?

(assignment continued on next page)

## B. Chi-Square Tests (Chapter 9)

- Exercise 9.16 (p. 557)

**Ignore the book's directions for this exercise. Follow these directions instead:**

- (a) Calculate the degrees of freedom for the data table.
- (b) Look up the critical value for the  $\chi^2$  test at 5% significance.
- (c) Perform the  $\chi^2$  test in Four Steps. Refer to Topic 4 Example 2 in the Notes to recall how to do this. **(Calculate  $\chi^2$  by hand in Step 2.)**
- (d) Enter the data table into a MINITAB worksheet and perform the  $\chi^2$  test in MINITAB. What are MINITAB's exact  $\chi^2$  value and P-value?
- (e) Redo Step 3 of the Four Steps, using the *P*-value instead of critical value for your decision.
- (f) Use the 2 Proportions procedure in MINITAB to find and interpret a 95% CI for percent of general interest ads vs. men's ads which are not sexual.
- (g) Does the comparison of proportions in (f) *reinforce* or *support* the conclusion from the  $\chi^2$  test? Explain why or why not.
- (h) Use the 2 Proportions procedure in MINITAB to find and interpret a 95% CI for percent of women's ads vs. men's ads which are sexual.
- (i) Does the comparison in (h) *reinforce* or *support* the conclusion from the  $\chi^2$  test? Explain why or why not.
- (j) Use the "table of  $\chi^2$  contributions" to explain why one of the above pairs of proportions reinforces the  $\chi^2$  test but the other does not.

- Exercise 9.24

**(Calculate  $\chi^2$  by hand and use the critical value. Do not use MINITAB.)**

- Exercise 9.25

**(Calculate  $\chi^2$  by hand and use the critical value. Do not use MINITAB.)**

- Exercise 9.29

Use MINITAB and Four Steps. Also add part (b):

- (b) Choose two proportions whose comparison *reinforces* or *supports* the conclusion from the  $\chi^2$  test. Answer questions (i)–(iii) below:
  - (i) Define the proportions.
  - (ii) Find and interpret a 95% confidence interval.
  - (iii) Explain how the CI supports the  $\chi^2$  test.

**(continued on next page)**

### C. Comparing Two Means (Chapter 7)

In each exercise determine whether the two samples are *paired* or *independent*.

**Ask this question: Is there a *pairing mechanism*?**

- Refer to Example 1 and Example 2 in the Topic 5 Notes. Open the data files `CACL Ratio` and `Fuel Additive` in MINITAB. Follow the steps shown in the Notes to reproduce the output.
- Exercise 7.58 (p. 456)  
No answer is required for (a). Answer (b) and (c). Also interpret the answer to (b).
- Exercise 7.84 (p. 470)  
Ignore parts (a) and (b). Do part (c) only.
- Exercise 7.85  
Interpret the answer for a client.
- Exercise 7.10 (p. 436)
- Exercise 7.11  
Also interpret answer.
- Exercise 7.43 (p. 447)
- Exercise 7.47 (p. 448)
- Exercise 7.87 (p. 470)  
**Ignore the book's directions for this exercise. Follow these directions instead:**
  - (a) Test for a difference in mean ego strength at 1% significance.
  - (b) Find a 99% confidence interval for the difference in mean ego strength.
  - (c) Summarize answers (a) and (b) for a client who is educated but has never studied Stats.
- Exercise 7.46 (p. 448)  
Ignore part (b). Do parts (a), (c), (d) only. Interpret for a client.
- Exercise 7.79 (p. 469)
- Exercise 7.80

(continued)

## D. Additional Practice

- (1) The American Automobile Association (AAA) is a national organization which also has 50 state chapters. Members of the Iowa chapter of the AAA would like to compare prices of regular gasoline to prices of diesel fuel within the state of Iowa.

In particular, suppose that the Iowa chapter would like to test the theory that diesel is more expensive on average than regular gasoline at Iowa service stations which sell both fuels, on Sept. 30, 2011.

The AAA national organization has provided the Iowa chapter with a database of prices, shown in the table below. The database was developed as follows:

- Five zip codes were randomly selected from all zip codes in the state of Minnesota, and five zip codes were randomly selected from all zip codes in the state of Iowa.
- In each selected zip code, a service station which sells both fuels was randomly chosen from all such service stations in that zip code. The prices for both diesel and regular gas on Sept. 30, 2011 at the chosen station were recorded in the database.

<b>Zip Code</b>	<b>City</b>	<b>State</b>	<b>Price (dollars/gallon) for Regular Gas</b>	<b>Price (dollars/gallon) for Diesel Fuel</b>
50005	Minerva	Iowa	3.66	3.73
50021	Ankeny	Iowa	3.63	3.60
55005	Bethel	Minnesota	3.81	3.88
56258	Marshall	Minnesota	3.86	3.92
50101	Galt	Iowa	3.72	3.80
56678	Becida	Minnesota	3.83	3.88
55732	Pike	Minnesota	3.93	3.98
50438	Miller	Iowa	3.60	3.67
52050	Greeley	Iowa	3.58	3.64
55383	Norwood	Minnesota	3.84	3.87
			<b>Avg. = 3.746</b>	<b>Avg. = 3.797</b>

Test the theory, using 5% significance.

- (a) Choose the correct  $P$ -value from the following choices:  
(A) 0.000 (B) 0.034 (C) 0.141 (D) 0.190
- (b) Make a decision.
- (c) Interpret the decision.

(end of assignment)