Chapter 21

33. Tuition 2011 How much more do public colleges and universities charge out-of-state students for tuition per year? A random sample of 19 public colleges and universities listed at www.collegeboard.com yielded the following data.

Institution	Resident	Nonresident
Univ of Akron (OH)	9545	17468
Athens State (AL)	5340	9930
Ball State (IN)	8558	22538
Bloomsburg U (PA)	8082	17442
UC Irvine (CA)	13122	36000
Central State (OH)	5672	12648
Clarion U (PA)	8828	15068
Dakota State	7621	9336
Fairmont State (WV)	5326	11230
Johnson State (VT)	9468	19908
Lock Haven U (PA)	8239	15599
New College of Florida	6060	29088
Oakland U (MI)	9938	23190
U Pittsburgh	16132	25540
Savannah State (GA)	6032	17646
SE Louisiana	4634	14139
W Liberty Univ (WV)	5266	13140
W Texas College	2370	3750
Worcester State (MA)	7653	13733

a) Create a 90% confidence interval for the mean difference in cost. Be sure to justify your procedure.
b) Interpret your interval in context.
c) A national magazine claims that public institutions charge state residents an average of $7000 less than out-of-staters for tuition each year. What does your confidence interval indicate about this assertion?

1. Which method? Which of the following scenarios should be analyzed as paired data?
a) Students take a MCAT prep course. Their before and after scores are compared.
b) Two different groups, each of 20 students, take a midterm. We compare their scores.
c) A group of college freshpeople are asked about the quality of the university cafeteria. A year later, the same students are asked about the cafeteria again. Do student's opinions change during their time at school?

29. Yogurt Is there a significant difference in calories between servings of strawberry and vanilla yogurt? Based on the data shown in the table (next page), test an appropriate hypothesis and state your conclusion. Don't forget to check assumptions and conditions!

	Calories per Serving	
Brand	Strawberry	Vanilla
America's Choice	210	200
Breyer's Lowfat	220	220
Columbo	220	180
Dannon Light'n Fit	120	120
Dannon Lowfat	210	230
Dannon la Crème	140	140
Great Value	180	80
La Yogurt	170	160
Mountain High	200	170
Stonyfield Farm	100	120
Yoplait Custard	190	190
Yoplait Light	100	100

27. Job satisfaction A company institutes an exercise break for its workers to see if it will improve job satisfaction, as measured by a questionnaire that assesses workers' satisfaction. Scores for 10 randomly selected workers before and after the implementation of the exercise program are shown in the table below.
a) Identify the procedure you would use to assess the effectiveness of the exercise program, and check to see if the conditions allow the use of that procedure.
b) Test an appropriate hypothesis and state your conclusion.
c) If your conclusion turns out to be incorrect, what kind of error did you commit?

Worker Number	Job Satisfaction Index	
	Before	After
1	34	33
2	28	36
3	29	50
4	45	41
5	26	37
6	27	41
7	24	39
8	15	21
9	15	20
10	27	37

12. Freshpeople 15? Many people believe that students gain weight as freshpeople. Suppose we plan to conduct a study to see if this is true.
a) Describe a study design requiring a matched-pairs t procedure to analyze the results.
b) Describe a study design requiring a two-sample t procedure to analyze the results.

39. BST Many dairy cows now receive injections of BST, a hormone intended to spur greater milk production. After the first injection, a test herd of 60 Ayrshire cows increased their mean daily production from 47 pounds to 61 pounds of milk. The standard deviation of the increases was 5.2 pounds. We want to estimate the mean increase a farmer could expect in their own cows.
a) Check the assumptions and conditions for inference.
b) Write a 95% confidence interval.
c) Explain what your interval means in this context.
d) Given the cost of BST, a farmer believes they cannot afford to use it unless they are sure of attaining at least a 25% increase in milk production. Based on your confidence interval, what advice would you give them?

40. BST II In the experiment about hormone injections in cows described in Exercise 39, a group of 52 Jersey cows increased average milk production from 43 pounds to 52 pounds per day, with a standard deviation of 4.8 pounds. Is this evidence that the hormone may be more effective in one breed than the other? Test an appropriate hypothesis and state your conclusion. Be sure to discuss any assumptions you make.