At the .01 significance level, is there a difference in the mean number of times men and women order take-out dinners in a month? What is the *p*-value?

24. Clark Heter is an industrial engineer at Lyons Products. He would like to determine whether there are more units produced on the night shift than on the day shift. Assume the population standard deviation for the number of units produced on the day shift is 21 and is 28 on the night shift. A sample of 54 day-shift workers showed that the mean number of units produced was 345. A sample of 60 night-shift workers showed that the mean number of units produced was 351. At the .05 significance level, is the number of units produced on the night shift larger?

25. Fry Brothers Heating and Air Conditioning Inc. employs Larry Clark and George Murnen to make service calls to repair furnaces and air conditioning units in homes. Tom Fry, the owner, would like to know whether there is a difference in the mean number of service calls they make per day. Assume the population standard deviation for Larry Clark is 1.05 calls per day and 1.23 calls per day for George Murnen. A random sample of 40 days last year showed that Larry Clark made an average of 4.77 calls per day. For a sample of 50 days George Murnen made an average of 5.02 calls per day. At the .05 significance level, is there a difference in the mean number of calls per day between the two employees? What is the *p*-value?

26. A coffee manufacturer is interested in whether the mean daily consumption of regular-coffee drinkers is less than that of decaffeinated-coffee drinkers. Assume the population standard deviation for those drinking regular coffee is 1.20 cups per day and 1.36 cups per day for those drinking decaffeinated coffee. A random sample of 50 regular-coffee drinkers showed a mean of 4.35 cups per day. A sample of 40 decaffeinated-coffee drinkers showed a mean of 5.84 cups per day. Use the .01 significance level. Compute the *p*-value.

27. A cell phone company offers two plans to its subscribers. At the time new subscribers sign up, they are asked to provide some demographic information. The mean yearly income for a sample of 40 subscribers to Plan A is $57,000 with a standard deviation of $9,200. For a sample of 30 subscribers to Plan B, the mean income is $61,000 with a standard deviation of $7,100. At the .05 significance level, is it reasonable to conclude the mean income of those selecting Plan B is larger?

28. A computer manufacturer offers a help line that purchasers can call for help 24 hours a day, 7 days a week. Clearing these calls for help in a timely fashion is important to the company's image. After telling the caller that resolution of the problem is important, the caller is asked whether the issue is software or hardware related. The mean time it takes a technician to resolve a software issue is 18 minutes with a standard deviation of 4.2 minutes. This information was obtained from a sample of 35 monitored calls. For a study of 45 hardware issues, the mean time for the technician to resolve the problem was 15.5 minutes with a standard deviation of 3.9 minutes. This information was also obtained from monitored calls. At the .05 significance level, does it take longer to resolve software issues? What is the *p*-value?

29. Suppose a manufacturer of Ibuprofen, a common headache remedy, recently developed a new formulation of the drug that is claimed to be more effective. To evaluate the new drug, a sample of 200 current users is asked to try it. After a one-month trial, 180 indicated the new drug was more effective in relieving a headache. At the same time, a sample of 300 current Ibuprofen users is given the current drug but told it is the new formulation. From this group, 261 said it was an improvement. At the .05 significance level, can we conclude that the new drug is more effective?

30. Each month the National Association of Purchasing Managers publishes the NAPM index. One of the questions asked on the survey to purchasing agents is: Do you think the economy is contracting? Last month, of the 300 responses, 160 answered yes to the question. This month, 170 of the 290 responses indicated they felt the economy was contracting. At the .05 significance level, can we conclude that a larger proportion of the agents believe the economy is contracting this month?

31. As part of a recent survey among dual-wage-earner couples, an industrial psychologist found that 990 men out of the 1,500 surveyed believed the division of household duties was fair. A sample of 1,600 women found 970 believed the division of household duties was fair. At the .01 significance level, is it reasonable to conclude that the proportion of men who believe the division of household duties is fair is larger? What is the *p*-value?

32. There are two major cell phone providers in the Colorado Springs, Colorado, area, one called HTC and the other Mountain Communications. We want to investigate whether

there is a difference in the proportion of times a call is successful. During a one-week period, 500 calls were placed at random times throughout the day and night to HTC. 450 of the calls were successful. A similar one-week study with Mountain Communications showed that 352 of 400 calls were successful. At the .01 significance level, is there a difference in the percent of time that cell phone connections are successful?

33. The Consumer Confidence Survey is a monthly review that measures consumer confidence in the U.S. economy. It is based on a typical sample of 5,000 U.S. households. Last month 9.1% of consumers said conditions were "good." In the prior month, only 8.5% held they were "good." Use the five-step hypothesis-testing method at the .05 level of significance to see whether you can determine there is an increase in the share asserting conditions are "good." Find the *p*-value and explain what it means.

34. A study was conducted to determine if there was a difference in the humor content in British and American trade magazine advertisements. In an independent random sample of 270 American trade magazine advertisements, 56 were humorous. An independent random sample of 203 British trade magazines contained 52 humorous ads. Does this data provide evidence at the .05 significance level that there is a difference in the proportion of humorous ads in British versus American trade magazines?

35. The AP-Petside.com poll contacted 300 married women and 200 married men. All owned pets. One hundred of the women and 36 of the men replied that their pets are better listeners than their spouses. At the .05 significance level, is there a difference between the responses of women and men?

36. The National Basketball Association had 39 black top executives (presidents or vice presidents) among its 388 senior managers. Meanwhile, Major League Baseball had only 11 blacks among its 307 top administrators. Test at the .05 significance level if this reveals the NBA has significantly more black participation in higher levels of management.

37. The manufacturer of an MP3 player wanted to know whether a 10% reduction in price is enough to increase the sales of its product. To investigate, the owner randomly selected eight outlets and sold the MP3 player at the reduced price. At seven randomly selected outlets, the MP3 player was sold at the regular price. Reported below is the number of units sold last month at the sampled outlets. At the .01 significance level, can the manufacturer conclude that the price reduction resulted in an increase in sales?

Regular price	138	121	88	115	141	125	96	
Reduced price	128	134	152	135	114	106	112	120

38. A number of minor automobile accidents occur at various high-risk intersections in Teton County despite traffic lights. The Traffic Department claims that a modification in the type of light will reduce these accidents. The county commissioners have agreed to a proposed experiment. Eight intersections were chosen at random, and the lights at those intersections were modified. The numbers of minor accidents during a six-month period before and after the modifications were:

	Number of Accidents							
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Before modification	5	7	6	4	8	9	8	10
After modification	3	7	7	0	4	6	8	2

At the .01 significance level, is it reasonable to conclude that the modification reduced the number of traffic accidents?

39. Lester Hollar is vice president for human resources for a large manufacturing company. In recent years, he has noticed an increase in absenteeism that he thinks is related to the general health of the employees. Four years ago, in an attempt to improve the situation, he began a fitness program in which employees exercise during their lunch hour. To evaluate the program, he selected a random sample of eight participants and found the number of days each was absent in the six months before the exercise program began and in the last six months. The results are on the next page. At the .05 significance level, can he conclude that the number of absences has declined? Estimate the *p*-value.