

9.9 Problem Set 3

Question 3, page 422, 14th Edition or **Filling Detergent Cartons** A production line operation is designed to fill cartons with laundry detergent to a mean weight of 32 ounces. A sample of cartons is periodically selected and weighed to determine whether underfilling or overfilling is occurring. If the sample data lead to a conclusion of underfilling or overfilling, the production line will be shut down and adjusted to obtain proper filling.

- a. Formulate the null and alternative hypotheses that will help in deciding whether to shut down and adjust the production line.
- b. Comment on the conclusion and the decision when H_0 cannot be rejected.
- c. Comment on the conclusion and the decision when H_0 can be rejected.

Question 7, page 424, 14th Edition or Carpet Salesperson Salaries: Carpetland salespersons average \$8000 per week in sales. Steve Contois, the firm's vice president, proposes a compensation plan with new selling incentives. Steve hopes that the results of a trial selling period will enable him to conclude that the compensation plan increases the average sales per salesperson.

- a. Develop the appropriate null and alternative hypotheses.
- b. What is the type i error in this situation? what are the consequences of making this error?
- c. What is the type ii error in this situation? what are the consequences of making this error?

Question 15, page 437, 14th Edition

or **Federal Tax Returns**. According to the IRS, individuals filing federal income tax returns prior to March 31 received an average refund of \$1056 in 2018. Consider the population of “last-minute” filers who mail their tax return during the last five days of the income tax period (typically April 10 to April 15)

- (a.) A researcher suggests that a reason individuals wait until the last five days is that on average these individuals receive lower refunds than do early filers. Develop appropriate hypotheses such that rejection of H_0 will support the researcher’s contention.
- (b.) For a sample of 400 individuals who filed a tax return between April 10 and 15, the sample mean refund was \$910. Based on prior experience a population standard deviation of $\sigma = \$1600$ may be assumed. What is the p-value?
- (c.) At $\alpha = 0.05$, what is your conclusion?
- (d.) Repeat the preceding hypothesis test using the critical value approach.

Question 16, page 437, 14th Edition

or **Credit Card Use by Undergraduates**. In a study entitled How Undergraduate Students Use Credit Cards, it was reported that undergraduate students have a mean credit card balance of \$3173. This figure was an all-time high and had increased 44% over the previous five years. Assume that a current study is being conducted to determine if it can be concluded that the mean credit card balance for undergraduate students has continued to increase compared to the original report. Based on previous studies, use a population standard deviation $\sigma = \$1000$.

- (a) State the null and alternative hypotheses.
- (b) What is the p-value for a sample of 180 undergraduate students with a sample mean credit card balance of \$3325?
- (c) Using a .05 level of significance, what is your conclusion?

Question 27, page 443, 14th Edition

or **Price of Good Red Wine.** According to the Vivino website, the mean price for a bottle of red wine that scores 4.0 or higher on the Vivino Rating System is \$32.48. A New England-based lifestyle magazine wants to determine if red wines of the same quality are less expensive in Providence, and it has collected prices for 56 randomly selected red wines of similar quality from wine stores throughout Providence. The mean and standard deviation for this sample are \$30.15 and \$12, respectively.

- (a) Develop appropriate hypotheses for a test to determine whether the sample data support the conclusion that the mean price in Providence for a bottle of red wine that scores 4.0 or higher on the Vivino Rating System is less than the population mean of \$32.48.
- (b) Using the sample from the 56 bottles, what is the p-value?
- (c) At $\alpha = .05$, what is your conclusion?
- (d) Repeat the preceding hypothesis test using the critical value approach

Question 27, page 414, 13th Edition

Which is cheaper: eating out or dining in? The mean cost of a flank steak, broccoli, and rice bought at the grocery store is \$13.04 (Money.msn website, November 7, 2012). A sample of 100 neighborhood restaurants showed a mean price of \$12.75 and a standard deviation of \$2 for a comparable restaurant meal.

- (a) Develop appropriate hypotheses for a test to determine whether the sample data support the conclusion that the mean cost of a restaurant meal is less than fixing a comparable meal at home.
- (b) Using the sample from the 100 restaurants, what is the p -value?
- (c) At $\alpha = 0.05$, what is your conclusion?
- (d) Repeat the preceding hypothesis test using the critical value approach.

Question 41, page 449, 14th Edition

Adequate Preparation for Retirement. In 2018, RAND Corporation researchers found that 71% of all individuals ages 66 to 69 are adequately prepared financially for retirement. Many financial planners have expressed concern that a smaller percentage of those in this age group who did not complete high school are adequately prepared financially for retirement.

- (a) Develop appropriate hypotheses such that rejection of H_0 will support the conclusion that the proportion of those who are adequately prepared financially for retirement is smaller for people in the 66–69 age group who did not complete high school than it is for the population of the 66–69 year old.
- (b) In a random sample of 300 people from the 66–69 age group who did not complete high school, 165 were not prepared financially for retirement. What is the p-value for your hypothesis test?
- (c) At $\alpha = .01$, what is your conclusion?

Question 49, page 454, 14th Edition

Miles per Gallon. A consumer research group is interested in testing an automobile manufacturer's claim that a new economy model will travel at least 25 miles per gallon of gasoline ($H_0 : \mu \geq 25$).

- (a) With a .02 level of significance and a sample of 30 cars, what is the rejection rule based on the value of x for the test to determine whether the manufacturer's claim should be rejected? Assume that s is 3 miles per gallon.
- (b) What is the probability of committing a Type II error if the actual mileage is 23 miles per gallon?
- (c) What is the probability of committing a Type II error if the actual mileage is 24 miles per gallon?
- (d) What is the probability of committing a Type II error if the actual mileage is 25.5 miles per gallon?

Question 56, page 458, 14th Edition

Underfilling Packages of Coffee. Suppose the project director for the Hilltop Coffee study (see Section 9.3) asked for a 0.10 probability of claiming that Hilltop was not in violation when it really was underfilling by 1 ounce ($\mu_a = 2.9375$ pounds). What sample size would have been recommended?

Question 75, page 466, 14th Edition

Using Social Media in a Job Search. According to Inc.com, 79% of job seekers used social media in their job search in 2018. Many believe this number is inflated by the proportion of 22- to 30-year-old job seekers who use social media in their job search. A survey of 22- to 30-year-old job seekers showed that 310 of the 370 respondents use social media in their job search. In addition, 275 of the 370 respondents indicated they have electronically submitted a resume to an employer.

- (a) Conduct a hypothesis test to determine if the results of the survey justify concluding the proportion of 22- to 30-year-old job seekers who use social media in their job search exceeds the proportion of the population that use social media in their job search. Use $\alpha = 0.05$.
- (b) Conduct a hypothesis test to determine if the results of the survey justify concluding that more than 70% of 22- to 30-year-old job seekers have electronically submitted a resume to an employer. Using $\alpha = 0.05$, what is your conclusion?