

Take Home Problems

1. The average annual salary in Colorado Springs is \$48,942. Suppose annual salaries are normally distributed with a standard deviation of \$5,886. A Colorado Springs worker is randomly selected. Calculate the probability for each of the following.
 - 1.1. The worker has an annual salary greater than \$65,000.
 - 1.2. The worker has an annual salary less than \$40,000.
 - 1.3. The worker has an annual salary greater than \$35,000.
 - 1.4. The worker has an annual salary between \$45,000 and \$55,000.

2. A researcher contacts a random sample of 30 grocery stores across the United States and asks the produce manager for the current price charged for a head of iceberg lettuce. Using the following results, construct a 95% confidence interval to estimate the price of lettuce in the United States.

1.59	1.25	1.65	1.40	0.89	1.19	1.50	1.49	1.30	1.39
1.29	1.60	0.99	1.29	1.19	1.20	1.50	1.49	1.29	1.35
1.10	0.89	1.10	1.39	1.39	1.50	1.50	1.55	1.20	1.15

3. According to a recent survey the average cost of a fast-food meal (cheeseburger, french fries and a medium size soft drink) in Denver is \$4.62. Suppose this figure was based on a sample of 27 fast-food establishments and the sample standard deviation was \$0.57. Construct a 95% confidence interval to estimate the average price of a fast-food meal in Denver.
4. Government reports indicate 74.2 percent of U.S. households have high-speed Internet at home. In a survey of 100 randomly selected households, the average price paid for high-speed internet by survey respondents is \$54.87. The standard deviation of high-speed internet prices across the U.S. is known to be \$11.20. Assuming there are 120 million households in the U.S., estimate the total value of the U.S. high-speed internet market using a 95% confidence interval.
5. Researchers have found the average urban U.S. resident consumes 3.3 pounds of food per day but they're not sure if the same figure applies to rural U.S. residents. Suppose 64 rural U.S. residents are identified by a random procedure and their average food consumption per day is 3.6 pounds. Assume a population variance of 1.31 pounds of food per day. Use a 5% level of significance to test the hypothesis that food consumption for urban U.S. residents is the same for rural U.S. residents based on the sample data.
6. The average cost per square foot for office rental space in the central business district of Philadelphia is \$23.58, according to Cushman & Wakefield. A real estate research

company wants to confirm this figure. The firm conducts a telephone survey of 95 offices in the central business district of Philadelphia and asks the office managers how much they pay in rent per square foot. Suppose the survey average is \$22.83 per square foot. The population standard deviation is \$5.11. Conduct a hypothesis test using $\alpha = .05$ to determine whether the cost per square foot reported by Cushman & Wakefield should be rejected.

7. Downtime in manufacturing is costly and can result in late deliveries, backlogs, failure to meet orders, and even loss of market share. Suppose a manufacturing plant has been averaging 23 minutes of downtime per day for the past several years, but during the past year, there has been a significant effort by both management and production workers to reduce downtime. In an effort to determine if downtime has been significantly reduced, company productivity researchers have randomly sampled 31 days over the past several months from company records and have recorded the daily downtimes shown below in minutes. Use these data and an alpha of .05 to determine if downtime has been significantly reduced. Assume downtimes are normally distributed.

19	22	17	19	32	24	16	18	27	17	24	19
23	27	28	19	17	18	26	22	19	15	18	25
23	19	26	21	16	21	24					