Assignment

Write

Explain in your own words the difference between a sample survey, an observational study, and an experiment.

Remember

To study a characteristic of interest, you must design a sample survey, observational study, or experiment; conduct the sample survey, observational study, or experiment; summarize the data; analyze the results; and draw a valid conclusion.

Practice

A company has come up with a new organic fertilizer. In order to test whether the new fertilizer works, they treated some staked tomato plants with the organic fertilizer and did not treat other staked tomato plants. The company collected a random sample of the yield of 85 tomato plants treated by the fertilizer and a random sample of 85 tomato plants not treated by the fertilizer. The plants treated with the fertilizer had a mean yield of 8.25 pounds of tomatoes with a standard deviation of 0.37 pound. The plants not treated with the fertilizer had a mean yield of 7.95 pounds of tomatoes with a standard deviation of 0.42 pound.

1. Identify the samples and the population.
2. Identify the characteristic of interest.
3. Is the company conducting a sample survey, an observational study, or an experiment? Explain your reasoning.
4. Determine the standard deviation for both population means.
5. Determine a 95% confidence interval for both population means.
6. Is the difference between the 2 population means statistically significant? Explain your reasoning.
7. What can you conclude about the effectiveness of the organic fertilizer? Discuss the effect of any potential bias on the results.

Stretch

1. Design an observational study for the height of male students in your grade and the grade below at your school.
   - Identify the samples and the population.
   - Identify the characteristic of interest.
   - Determine the standard deviation for both population means.
   - Determine a 95% confidence interval for both population means.
   - Determine whether the difference between the 2 population means is statistically significant.
   - Draw a conclusion about the heights of male students in the two grades. Discuss the effect of any potential bias on the results.

Review

1. A community college tries a new program designed to increase student satisfaction with the college. Prior to the program, 1623 out of 2151 students polled were satisfied. After the program, 1718 out of 2201 students polled were satisfied.

   a. Determine the sample proportion of students who were satisfied for each poll.

   b. Determine whether the results of the 2 polls are statistically significant. Use a 95% confidence interval when making your calculations.

   c. Based on your findings, what can you conclude about the impact of the program?

2. The principal of a school is going to order pizzas for a staff luncheon. The delivery times for Sebastion's Pizzaria have a mean of 35 minutes and a standard deviation of 4.5 minutes. The delivery times for Lorenzo's Pizzaria have a mean of 33 minutes and a standard deviation of 2.5 minutes. Delivery times are normally distributed.

   a. The principal would like the pizza to be delivered in less than 30 minutes. From which pizzaria would the principal have a higher probability of getting the pizza delivered in the time she wants? Explain your reasoning.

   b. Due to a meeting running late, the principal would like the pizza to be delivered in between 35 and 40 minutes. From which pizzaria would the principal have a higher probability of getting the pizza delivered in the time she wants? Explain your reasoning.

3. Divide the rational expressions.

$$\frac{8x^3 - 16x^2}{x - 5} \div \frac{40x^3 + 16x^2}{5x + 2}$$