



**For problems 4–7, use the following scenario.**

A science class conducted a blind taste test with 140 participants to determine if people can taste the difference between bottled water and the school's water fountain water. A randomized simulation with 10,000 trials resulted in an observed difference of 0.4 points. The standard deviation of the simulated difference was 1.38 points.

Group $n = 70$	Mean Taste Rating (1–10)
Treatment: bottled water	6.2
Control: water fountain water	5.8

Additional Considerations:

- The water fountain water is filtered.
  - The science class made sure all water was the same temperature before the taste test.
  - A typical student drinks the equivalent of 4 bottles of water daily.
  - A student can purchase a bottle of water for \$1.50 or a reusable water bottle for \$12.
- 4) Calculate the  $z$ -score for the observed difference. Explain the statistical significance at the 5% level.
- 5) Do the results prove that people can correctly identify the bottled water?
- 6) Calculate how much money a student would spend on bottled water for a 180-day school year. Compare this to the cost of a reusable water bottle.
- 7) Based on the statistical evidence and cost comparison, what type of water would you recommend students drink?

**For problems 8–10, use the scenario below.**

Fit-4-Life Gym wants to estimate the number of members expected to renew their annual gym membership. The gym randomly surveys 225 members whose membership is expiring soon. From previous years, Fit-4-Life has calculated the renewal standard deviation to be 29.2 members.

- 8)** Calculate and explain the maximum error of the estimate for the 90% level,  $z = 1.645$ .
- 9)** Determine a 99% confidence interval if the average renewal rate is 82% and  $E = 5.01$ . Explain.
- 10)** If the gym manager wants to be as accurate as possible, which is a better estimate? Explain.