PRACTICE IX

Inference

1. A company advertises it has a process that can extract a mean of 35 grams of dissolved salts from 1 liter of seawater. A geologist believes the true figure is lower. Use this process, a sample of fifteen 1 liter containers of seawater from 15 random locations yields a mean of 34.82 grams of dissolved salts with a standard deviation of 0.65 grams. Assume the sample distribution is symmetric and unimodal with no outliers.

   (a) Is there sufficient evidence for the geologist to dispute the advertisement? Justify your answer.

   (b) A large-scale test of a second company's process shows yields of dissolved salts that are roughly normally distributed with a mean of 34.75 grams and a standard deviation of 0.83 grams. What is the probability that using this second process, a 1 liter container of seawater will yield at least 35 grams of dissolved salts?

(c) What is the probability that when using this second process on 10 randomly selected 1 liter containers of seawater, at least 2 of them yield at least 35 grams of dissolved salts?

2. Can a particular video game improve a batter's reaction time? Batters' reaction times (fraction of a second between the ball leaving a pitcher's hand and the start of a swing) are measured before and after playing the video game for 25 hours.

   (a) What is the appropriate test, the hypothesis, and the conditions to check?

   (b) Suppose the test is run and no statistically significant improvement is detected in batter reaction times after the video game training. If the researcher plans a second test, name two specific changes that can be made to increase the power of the test. Explain your choices.