SAT Math Scores

High school students who take the SAT Math exam a second time generally score higher than on their first try. Past data suggest that the score increase has a standard deviation of about 50 points. How large a sample of high school students would be needed to estimate the mean change in SAT score to within 2 points with 95% confidence? Show your work.

Travel Time to Work

A study of commuting times reports the travel times to work of a random sample of 20 employed adults in New York State. The mean (x-bar) is 31.25 minutes, and the standard deviation is 21.88 minutes. What is the standard error of the mean? Interpret this value in context.
Vitamin C Content

Several years ago, the U.S. Agency for International Development provided 238,300 metric tons of corn-soy blend (CSB) for emergency relief in countries throughout the world. CSB is a highly nutritious, low-cost fortified food. As part of a study to evaluate appropriate vitamin C levels in this food, measurements were taken on samples of CSB produced in a factory.

The following data are the amounts of vitamin C, measured in milligrams per 100 grams (mg/100 g) of blend, for a random sample of size 8 from one production run:

\[26 \quad 31 \quad 23 \quad 22 \quad 11 \quad 22 \quad 14 \quad 31\]

Construct and interpret a 95% confidence interval for the mean amount of vitamin C \( \mu \) in the CSB from this production run.