1. An inventor has developed a new, energy-efficient lawn mower engine. He claims that the engine will run continuously for 5 hours (300 minutes) on a single gallon of regular gasoline. Suppose a simple random sample of 50 engines is tested. The engines run for an average of 295 minutes, with a standard deviation of 20 minutes. Test the null hypothesis that the mean run time is 300 minutes against the alternative hypothesis that the mean run time is not 300 minutes. Assume that run times for the population of engines are Normally distributed.

2. Bon Air Elementary School has 300 students. The principal of the school thinks that the average IQ of students at Bon Air is over 110. To prove her point, she administers an IQ test to 20 randomly selected students. Among the sampled students, the average IQ is 108 with a standard deviation of 10. Based on these results, should the principal accept or reject her original hypothesis? Assume that IQ scores for the population of students are Normally distributed.

3. A bus company advertised a mean time of 150 minutes for a trip between two cities. A consumer group had reason to believe that the mean time was more than 150 minutes. A random sample of 40 trips showed a mean $\bar{x}$= 153 minutes and a standard deviation s=7.5 minutes. Determine if the consumer group's hypothesis is correct.

4. According to the Centers for Disease Control, the mean number of cigarettes smoked per day by individuals who are daily smokers is 18.1. Do retired adults who are daily smokers smoke less than the general population of daily smokers? To answer this question, we obtain a random sample of 40 retired adults who are current daily smokers and record the number of cigarettes smoked on a randomly selected day. The data result in a sample mean of 16.8 cigarettes and a standard deviation of 4.7 cigarettes.

5. A recent report indicated that waiters and waitresses at casual dining restaurants make an average of $100 per night in tips with a standard deviation of $15. Maureen works in a casual dining restaurant and doesn't think this is correct. She feels she makes much less than this in an average night. Over the next five work nights, she computes her tips and the average is $93. Determine if the average on tips is really $100. Assume the population distribution of tip amounts in dollars is approximately Normal with no outliers and no strong skewness.