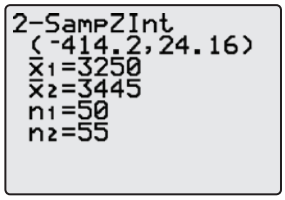

The 85% confidence interval for the difference between the two means ranges from approximately –$414 to $24. The confidence interval can be written mathematically using either inequality symbols or interval notation, as shown below.

$$-414 < \mu_1 - \mu_2 < 24$$

or

$$(-414, 24)$$

Because the interval ranges from a negative number to a positive one, the interval contains the number 0. In other words, the data do not provide evidence that the two population means are unequal at this level of confidence. Therefore, with 85% confidence, we can say that there is not sufficient evidence to support the claim that using the fuel additive results in a decrease in repair costs.

9.1 Section Exercises

Note: *For all exercises in this section, you may assume that the requirements mentioned in this section are met; namely, all samples are independent, simple random samples, both population standard deviations are known, and either both sample sizes are at least 30 or both population distributions are approximately normal.*

Point Estimates for Differences between Two Population Means

Find the point estimate for the true difference between the population means.

1. $\bar{x}_1 = 14$ and $\bar{x}_2 = 11$
2. Sample 1's mean is 45 and Sample 2's mean is 56.
3. One-mile running times for a sample of 65 participants had a mean of 8.45 minutes. The mean time for a sample of 77 participants is 8.25 minutes.
4. The mean temperature for Group A is 72.4 °F and the mean temperature for Group B is 77.3 °F.
5. The following data represent temperatures in degrees Celsius for random samples of water taken from two different geysers at a National Park.

Water Temperatures of Geyser A

Stem	Leaves
34	6
35	2 4 4 5 5 6 7 7 7 7
36	1 2 3 4 4 5 5 5 6 7 8 8 9 9
37	0 0 0 0 1 1 2 2 2 2 5 6 6 9
38	0 0 1 1 2
Key: 34	**6 = 34.6 °C**

Water Temperatures of Geyser B

Stem	Leaves
33	3 3 4 4 5 5 6 7 8 8 9 9
34	0 0 1 1 2 2 2 3 4 5 5 7 9 9
35	2 3 3 3 6 6 8 8 8
36	5
37	2 2 4 4 5 8
Key: 33	**3 = 33.3 °C**

6. Weights (in Grams) of Candy Bar A: 93, 92, 93, 94, 92, 93, 95, 94, 93, 93, 92

Weights (in Grams) of Candy Bar B: 93, 94, 95, 92, 93, 91, 96, 92, 93, 93, 94, 95, 92

Margins of Error of Confidence Intervals for Differences between Two Population Means (σ Known, Independent Samples)

Calculate the margin of error of a confidence interval for the difference between the two population means using the given information.

7. $\sigma_1 = 2.88, \quad n_1 = 73, \quad \sigma_2 = 3.01, \quad n_2 = 99, \quad c = 0.99$

8. $\sigma_1 = 5.3, \quad n_1 = 31, \quad \sigma_2 = 4.9, \quad n_2 = 40, \quad \alpha = 0.02$

9. $\sigma_1 = 0.36, \quad n_1 = 88, \quad \sigma_2 = 1.09, \quad n_2 = 83, \quad c = 0.95$

10. $\sigma_1 = 11.54, \quad n_1 = 115, \quad \sigma_2 = 10.65, \quad n_2 = 122, \quad \alpha = 0.01$

Confidence Intervals for Differences between Two Population Means (σ Known, Independent Samples)

Construct and interpret each specified confidence interval.

11. A local pizza shop claims to have a shorter delivery time than its competitor, a national chain. A local reporter collects data on random samples of deliveries from the local shop and from the competitor. Based on 48 deliveries, the local store has a mean delivery time of 29 minutes. Assume that the population standard deviation of the local shop's delivery times is 8 minutes. Based on 52 deliveries, the national chain store has an average delivery time of 31 minutes. Assume that the population standard deviation of the chain store's delivery times is 9 minutes. Construct and interpret a 90% confidence interval for the true difference between the mean delivery times for the two restaurants.

12. Dogsled drivers, known as mushers, use several different breeds of dogs to pull their sleds. One proponent of Siberian Huskies believes that sleds pulled by Siberian Huskies are faster than sleds pulled by other breeds. He times 35 teams of Siberian Huskies on a particular short course, and they have a mean time of 5.3 minutes. The mean time on the same course for 32 teams of other breeds of sled dogs is 6.1 minutes. Assume that the times on this course have a population standard deviation of 1.1 minutes for teams of Siberian Huskies and 1.9 minutes for teams of other breeds of sled dogs. Construct and interpret a 99% confidence interval for the true difference between the mean times on this course for teams of Siberian Huskies and teams of other breeds of sled dogs.

13. There are two elementary schools in Caleb's community. Third graders in both schools recently took the same standardized exam. A random sample of 45 third graders from the first school has a mean exam score of 75. A random sample of 39 third graders from the second school has a mean score of 78. Assume that the population standard deviations of the third graders' scores are known to be 10 for the first school and 5 for the second school. Construct and interpret a 95% confidence interval for the true difference between the mean exam scores for the two schools.

14. A contributor for the local newspaper is writing an article for the weekly fitness section. To prepare for the story, she conducts a study to compare the exercise habits of people who exercise in the morning to the exercise habits of people who work out in the afternoon or evening. She selects three different health centers from which to draw her samples. The 49 people she sampled who work out in the morning have a mean of 4.1 hours of exercise each week. The 54 people surveyed who exercise in the afternoon or evening have a mean of 3.7 hours of exercise each week. Construct and interpret a 95% confidence interval for the true difference between the mean amounts of time spent exercising each week by people who work out in the morning and those who work out in the afternoon or evening at the three health centers. Assume that the weekly exercise times have a population standard deviation of 0.7 hours for people who exercise in the morning and 0.5 hours for people who exercise in the afternoon or evening.

15. Russell is doing some research before buying his first house. He is looking at two different areas of the city, and he wants to know if there is a significant difference between the mean prices of homes in the two areas. For the 34 homes he samples in the first area, the mean home price is $168,500. Public records indicate that home prices in the first area have a population standard deviation of $22,950. For the 39 homes he samples in the second area, the mean home price is $171,800. Again, public records show that home prices in the second area have a population standard deviation of $30,995. Construct and interpret a 90% confidence interval for the true difference between the mean home prices in the two areas.

16. A sports news station wanted to know whether people who live in the North or the South are bigger sports fans. For its study, 121 randomly selected Southerners were surveyed and found to watch a mean of 4.1 hours of sports per week. In the North, 137 randomly selected people were surveyed and found to watch a mean of 3.9 hours of sports per week. Find and interpret a 99% confidence interval for the true difference between the mean numbers of hours of sports watched per week for the two regions if the South has a population standard deviation of 1.8 hours per week and the North has a population standard deviation of 1.9 hours per week.