

Section 8.2

Example

1. Suppose that the confidence level is 95%, Find z_c .
2. Suppose that the confidence level is 98%, Find z_c .

Example Geologists are interested in shifts and movements of the earth's surface indicated by fractures in the earth's crust. One of the most famous large fractures is the San Andreas fault in California. A geologist attempting to study the movement of the relative shifts in the earth's crust at a particular location found many fractures in the local rock structure. In an attempt to determine the mean angle of the fractures, she randomly sampled 50 fractures and found the sample mean to be 39.8 degrees. Assume that σ is 17.2 degrees.

1. Find and interpret a 98% confidence interval for the parameter of interest.
2. Another geologist claims that the population mean angle of the fractures in the San Andreas fault is less than 42 degrees. Based on your work above, do you agree with the claim? Explain and defend your answer.

Example At wind speeds above 1000 cm/sec significant sand-moving events begin to occur. In particular, wind speeds above 1000 cm/sec move sand to new locations. The cyclic nature of wind and moving sand determines the shape and location of large sand dunes. At one test site, the prevailing direction of the wind did not change. However, the speed did change. Sixty wind speed readings gave an average speed of 1075 cm/sec. From long term experience, it can be assumed that $\sigma = 265$ cm/sec.

1. Find and interpret a 95% confidence interval for the parameter of interest.
2. Does the interval that you computed above indicate that sand is moving at this site? Explain.

Example Suppose that a researcher wants to determine how long, on average, it takes a typical adult to assemble a child's bicycle. How many typical adults must be sampled in order to be 99% confident that the sample mean $\bar{x}$ is within 7 minutes of the population mean time, μ . Assume that it is known that it takes a typical adult between one and two hours to assemble a child's bicycle.

Example A child psychologist wants to estimate the mean age at which a child learns to talk using a confidence interval. Find the sample size necessary for a 96% confidence interval with maximal error estimate 6 weeks for the mean age at which a child learns to talk. Assume $\sigma = 20$ weeks.

Example Noise level tests were done on a random sample of 40 new light rail vehicles (LRVs). The results of the tests gave a sample mean noise level of 65 decibels. Assume that it is known that the population standard deviation is 6 decibels.

1. Find and interpret a 94% confidence interval for the parameter of interest.
2. What if we got a larger sample size, $n = 50$? What would be the confidence interval then? Is this interval more likely to contain μ ? Less likely? Is there no change in the likelihood?
3. What if we increase the level of confidence to 98%? What would be the confidence interval then? Is this interval more likely to contain μ ? Less likely? Is there no change in the likelihood?

Section 8.2

Example How much does a sleeping bag cost? Assume that you want a sleeping bag that will keep you warm in temperatures from 20° F to 45° F. A random sample of costs taken from Backpacker Magazine is as follows (costs are in dollars). Assume that the population of sleeping bag costs is approximately normal.

80, 90, 100, 75, 105, 110, 120, 95, 70, 105

1. Find and interpret a 90% confidence interval for the parameter of interest.
2. An avid backpacker claims that you can get a summer sleeping bag (rated from 20° F to 45° F) for less than \$100 (on average). Based on your interval computed above, do you support this claim?

Example Big Shoulders Insurance Company took a random sample of 50 insurance claims paid out during the last year and found that the mean was \$1570 and the standard deviation was \$260.

1. Find and interpret a 90% confidence interval for the parameter of interest.
2. The industry standard for last year was an average claim of \$1540. Based on your interval computed above, does it appear that Big Shoulder's claims are above average? Explain.

Section 8.3

Example Isabel Myers was a pioneer in the study of personality types. In a random sample of 519 judges, it was found that 234 were extroverts.

1. Compute and interpret a 95% confidence interval for the parameter of interest.
2. Based on your interval computed above, does it appear that a minority of judges are extroverts? Explain.

Example The National Study of the Changing Work Force recently conducted a survey of 2940 wage a salaried workers. In response to the question "What does success mean to you?" 1538 responded "Personal satisfaction from doing a good job." Find and interpret a 95% confidence interval for the parameter of interest.

1. Preliminary estimates show that 15% of small businesses declared bankruptcy last year. Using this estimate, how many small businesses should be included in a sample to be 99% sure the point estimate will be within 5% of the population proportion?
2. If no preliminary estimate is available, how many small businesses should be included in a sample to be 99% sure the point estimate will be within 5% of the population proportion?