



## Equitable Equations: *Introduction to confidence intervals*

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### Problem 1

In a random sample of  $n = 55$  repairs at a certain auto garage, the average cost was \$374.75. Construct a level 90% confidence interval for the population mean repair cost at this garage. Assume the population standard deviation is  $\sigma = \$72.50$ .

### Problem 2

Repeat problem 1 with a sample of size  $n = 85$ . Which confidence interval is wider? Briefly explain.

### Problem 3

In a random sample of  $n = 218$  eruptions of a geyser, the mean duration was 2.42 minutes. Construct a level 95% confidence interval for the population mean. Assume the population standard deviation is  $\sigma = 1.04$  minutes.

### Problem 4

Repeat problem 3 with a standard deviation of  $\sigma = 1.92$ . Which confidence interval is wider? Briefly explain.

### Problem 5

This problem refers to the **mileage** data set, available on Moodle. This set includes fuel efficiency measurements for a random sample of sports cars. Construct a level 95% confidence interval for the population mean assuming  $\sigma = 3.5$  mpg.

### Problem 6

Repeat problem 5 with a confidence level of 99%. Which confidence interval is wider? Briefly explain.



## Equitable Equations: *Confidence intervals and sample size*

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### Problem 1

A fast-food restaurant needs to estimate the mean carbohydrate count in a new sandwich to within 15 grams. How large a sample is needed if the population standard deviation is  $\sigma = 25g$ ? Use 95% confidence.

### Problem 2

How many sandwiches would the restaurant need to test to estimate the mean carbohydrate count to within 5g?

### Problem 3

Suppose the restaurant realizes that they've underestimated  $\sigma$ , the amount of variability in the carbs of their sandwiches. Would the sample sizes in problems 1 and 2 be increased or decreased?



# Equitable Equations: *The t-distribution*

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## Problem 1

What is the t-distribution? How is it similar and different from the standard normal distribution?