Math Virtual Learning

Probability and Statistics

May 5, 2020

Probability and Statistics
Lesson: May 5, 2020

Objective/Learning Target:
Students will be able to calculate the predicted range of a population mean with a given level (percent) of confidence
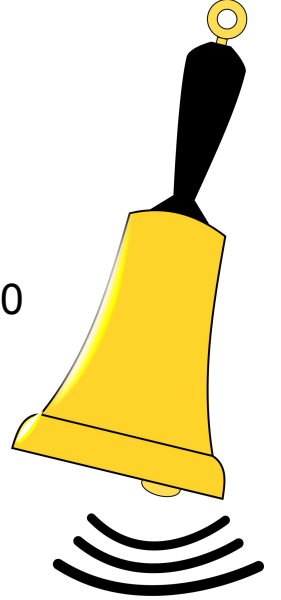
Let's Get Started!

The owner of the local lawn and garden store was trying to decide if his rose bushes were ready to put on the sales floor. He selected a random sample of 20 bushes and then counted the number of flowers on each bush. He got:

9, 2, 5, 4, 12, 7, 8, 11, 9, 3, 7, 4, 12, 5, 4, 10, 9, 6, 9, 4

Using the Desmos Calculator and this video refresher from the April 14th Virtual Lesson

1. **Calculate the Mean**

2. **Calculate the Standard Deviation**

Let's Get Started!

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Using the Desmos Calculator and this video refresher,

1. Calculate the Mean: **7**

2. Calculate the Standard Deviation: **3.06**
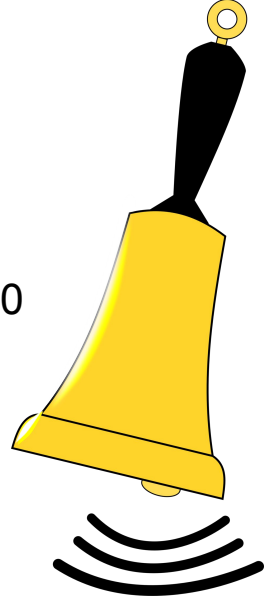
Confidence Intervals Recap

- It is very rare to have enough data to know the population mean
- We can predict the population mean given information about a sample
- Our predictions will have some margin of error or "wiggle room"
- The range of our prediction is called a **CONFIDENCE INTERVAL**
- To find the margin of error (wiggle room) we used the formula

$$Z \frac{s}{\sqrt{n}}$$

- To find the Confidence Interval, we added and subtracted this margin of error from the mean

Confidence Intervals Recap

- This chart showed the z-scores for the most common Confidence Percentages
- Confidence Levels NOT on this chart can be found on the Z-score to Percentile Chart

Confidence Interval	Z
80%	1.282
85%	1.440
90%	1.645
95%	1.960
99%	2.576
99.5%	2.807
99.9%	3.291

Review Example!

A news article recently published that the mean SAT math score for a group of 50 students who took the SAT last year was 600. This sample had a standard deviation of 50. Find, with 95% confidence, the mean SAT math score of all students in the United States who took the SAT last year.

To solve this we need to find the:

★   Determine the Z-Score for our Specific Confidence Level
★   Find the Margin of Error
★   Find the Interval (Subtract & Add the Margin of Error to the Sample Mean)
★   Put the Answer in Context of the Problem

Review Example Continued

A news article recently published that the mean SAT math score for a group of 100 students who took the SAT last year was 600. This sample had a standard deviation of 50. Find, with 95% confidence, the mean SAT math score of all students in the United States who took the SAT last year.

★ **95% Confidence Level has a z-score of 1.96**
★ **Margin of Error**

$$Z \frac{S}{\sqrt{n}} \qquad 1.96 * \frac{50}{\sqrt{100}} = 9.8$$

★ **Find the Interval**

600 - 9.8 = 590.2
600 + 9.8 = 609.8

★ **Put the Answer in Context**

You can be 95% confident that the mean math score for students who took the SAT last year is between 590.2 and 609.8

Practice Day!

Click this link to practice Confidence Intervals.

Scroll to the bottom of the page until you see

There are 8 practice problems for you to try.

NOTE: The last few problems will require you to calculate the mean and standard deviation yourself. The data will be given, but not the statistical measures. If you need a review on how to find the Standard Deviation, those lessons can be found at the following links:

Standard Deviation Hand Calculation **(without Technology)**

Standard Deviation with Technology