3.6.1 Activity

Part 1: Test Scores

Here are the test scores for Mrs. Diaz's class:

35, 42, 74, 37, 43, 64, 74, 53, 61, 45, 35, 46, 54, 71, 44, 47, 54, 41, 37, 43

You will work in Excel for this activity.

Step 1: Calculate the z-score to represent the raw test scores.

1. Enter the data into column A under test scores.
2. Calculate the average (mean) of the test scores by inserting a formula in cell E1. Use the **=AVERAGE()** function. Interpret the mean in context.

> The average test score in Mrs.Diaz's class is 50

3. Calculate the standard deviation of the test scores by inserting a formula in cell E2. Use the **=STDEV.P()** function. Interpret the standard deviation in context. Relate your interpretation to the standard normal distribution.

> The test scores in Mrs. Diaz's class are 12.39 points away from the average test score.

4. The z-score formula is **[raw score – mean]/standard deviation**. Start this formula in B2 by typing **=(A1-E1)/E2** and press **Enter**. What score do you get? **Note**: *Z-scores can be positive or negative! Recall that 50 percent of scores will be above or below the mean.*

> First z-score calculation: (35 - 50) / 12.39 = -1.21

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5. Adjust your formula in B2 to **=(A1-E1)/E2**

   The dollar signs ($) ensure that when we apply this formula to the rest of the cells, E1 (mean) and E2 (standard deviation) are locked in place and will not change.

6. Double-click the right-hand corner of B2 to apply the formula to the rest of the data set.

7. Save your workbook. We will use it in another activity.

Part 2: Calculating Sample Size

Mrs. Diaz would like to conduct a survey on students' study habits and test scores. Use the formula for sample size to calculate how many students she would need for this study.

Mrs. Diaz would like to operate with a 90 percent confidence level with a 5 percent margin of error. She will conduct the study at a middle school with 700 students. Of those students, 350 meet the current GPA requirements for her study.

Step 1: Find the corresponding z-score for the given confidence level.

1. With a 90 percent confidence level, what would be the corresponding z-score for this level? Type this in E3.

   1.645

2. Calculate the population proportion for this study. Type this in E4.

3. Type the margin of error as a decimal in E5.

Step 2: Use the sample size formula to calculate the desired sample size.

4. Let's translate this formula into **Excel** syntax. Write the formula here first. Use cell references instead of numbers. **Note:** *You can square a number like Z by denoting ^2.*

> = ((E3 * SQRT(E4 * (1 - E4))) / E5)^2

5. Insert this formula in E6 and press **Enter**.

6. What sample size does Mrs. Diaz need?

> n = 271   NOTE: Using the alternative formula for the sample size
>
> n = (E3 / (2 * E5)) ^2 results in the same sample size

7. Challenge - do the same exercise using Python. Get started by going to https://jupyter.org/try-jupyter/lab/ and click on new -> notebook