How do I convert Z-scores to raw scores step-by-step?

Authored by

stats writer

April 29, 2024

Converting Z-scores to raw scores involves using a mathematical formula to transform standardized scores (Z-scores) into their original, unstandardized form (raw scores). This process is useful in statistics and data analysis, as it allows for comparison and interpretation of scores on different scales. To convert Z-scores to raw scores, one must first calculate the mean (μ) and standard deviation (σ) of the original dataset. Then, using a simple formula ($X = Z\sigma + \mu$), the Z-score can be multiplied by the standard deviation and added to the mean to obtain the raw score. This process can be repeated for each Z-score in the dataset, resulting in a set of corresponding raw scores. By following these steps, one can accurately convert Z-scores to raw scores and use them for further analysis and interpretation.

Convert Z-Scores to Raw Scores (Step-by-Step)

A z-score tells us how many standard deviations away a value is from the mean. We use the following formula to calculate a z-score:

Z-Score = $(x - \mu) / \sigma$

where:

x: A raw data valueμ: The mean of the datasetσ: The standard deviation of the dataset

To convert a z-score into a raw score (or "raw data value"), we can use the following formula:

Raw Score = $\mu + z\sigma$

The following examples show how to convert z-scores

to raw scores in practice.

Example 1: Annual Incomes

In a certain city, the mean household annual income is $45,000 with a standard deviation of $6,000.

Suppose a certain household has an annual income with a z-score of 1.5. What is their annual income?

To solve this, we can use the raw score formula:

Raw score = μ + zσRaw score = $45,000 + 1.5*$6,000Raw score = $54,000

A household with a z-score of 1.5 has an annual income of $54,000.

Example 2: Exam Scores

For a certain math exam, the mean score is 81 with a standard deviation of 5.

Suppose a certain student has an exam score with a z-score of -2. What is their exam score?

To solve this, we can use the raw score formula:

Raw score = μ + zσRaw score = 81+ (-2)*5Raw score = 71

A student with a z-score of -2 received an exam score of 71.

Example 3: Plant Heights

The mean height of a certain species of plant is 8 inches with a standard deviation of 1.2 inches.

Suppose a certain plant has a height with a z-score of 0. What is the height of this plant?

To solve this, we can use the raw score formula:

Raw score = μ + zσRaw score = 8+ 0*5Raw score = 8

A plant with a z-score of 0 is 8 inches tall.