what are Examples of Using Z-Scores?

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Z-scores are a statistical tool commonly used in various fields to standardize data and allow for fair comparisons. In standardized test scores, z-scores are used to compare individual student scores on tests such as the SAT or ACT. This allows for a fair comparison between students from different schools and regions. Z-scores are also used in performance evaluations, where they can eliminate biases and provide a more accurate assessment of an individual's performance compared to their peers. In financial analysis, z-scores can help determine the risk and potential return of a particular stock. In medical research, z-scores are used to compare the effectiveness of different treatments or medications, ensuring more accurate comparisons and reliable conclusions. Lastly, in sports, z-scores are used to compare the performance of individual players or teams, taking into account factors such as scoring rules or equipment. Overall, z-scores are a valuable tool in various fields to standardize data and facilitate fair comparisons.

5 Examples of Using Z-Scores in Real Life

In statistics, a tells us how many standard deviations away a given value lies from a population mean.

We use the following formula to calculate a z-score for a given value:

$z = (x - \mu) / \sigma$

where:

x: Individual data value
μ: Mean of population
σ: Standard deviation of population

The following examples show how z-scores are used in real life in different scenarios.

Example 1: Exam Scores

Z-scores are often used in academic settings to analyze how well a student's score compares to the mean score on a given exam.

For example, suppose the scores on a certain college entrance exam are roughly normally distributed with a mean of 82 and a standard deviation of 5.

If a certain student received a 90 on the exam, we would calculate their z-score to be:

$z = (x - \mu) / \sigma$

$z = (90 - 82) / 5$

$z = 1.6$

This means that this student received a score that was 1.6 standard deviations above the mean.

We could use the to find that a z-score of 1.6 represents a value that is greater than 94.52% of all exam scores.

Example 2: Newborn Weights

Z-scores are often used in a medical setting to analyze how a certain newborn's weight compares to the mean

weight of all babies.

For example, it's well-documented that the weights of newborns are normally distributed with a mean of about 7.5 pounds and a standard deviation of 0.5 pounds.

If a certain newborn weights 7.7 pounds, we would calculate their z-score to be:

$z = (x - \mu) / \sigma$

$z = (7.7 - 7.5) / 0.5$

$z = 0.4$

This means that this baby weighs 0.4 standard deviations above the mean.

We could use the to find that a z-score of 0.4 represents a weight that is greater than 65.54% of all baby weights.

Example 3: Giraffe Heights

Z-scores are often used in a biology to assess how the height of a certain animal compares to the mean population height of that particular animal.

For example, suppose the heights of a certain species of giraffe is normally distributed with a mean of 16 feet

and a standard deviation of 2 feet.

If a certain giraffe from this species is 15 feet tall, we would calculate their z-score to be:

$z = (x - \mu) / \sigma$
$z = (15 - 16) / 2$
$z = -0.5$

This means that this giraffe has a height that is 0.5 standard deviations below the mean.

We could use the to find that a z-score of -0.5 represents a height that is greater than just 30.85% of all giraffes.

Example 4: Shoe Size

Z-scores can be used to determine how a certain shoe size compares to the mean population size.

For example, it's known that shoe sizes for males in the U.S. is roughly normally distributed with a mean of size 10 and a standard deviation of 1.

If a certain man has a shoe size of 10, we would calculate their z-score to be:

$z = (x - \mu) / \sigma$

$z = (10 - 10) / 1$

$z = 0$

This means that this man has a shoe size that is 0 standard deviations away from the mean.

We could use the to find that a z-score of 0 represents a shoe size that is greater than exactly 50% of all males.

Example 5: Blood Pressure

Z-scores are often used in medical settings to assess how an individual's blood pressure compares to the mean population blood pressure.

For example, the distribution of diastolic blood pressure for men is normally distributed with a mean of about 80 and a standard deviation of 20.

If a certain man has a diastolic blood pressure of 100, we would calculate their z-score to be:

$z = (x - \mu) / \sigma$

$z = (100 - 80) / 20$

$z = 1$

This means that this man has a diastolic blood pressure that is 1 standard deviation above the mean.

We could use the to find that a z-score of 1 represents a blood pressure size that is greater than 84.13% of all males.

The following tutorials provide additional information about z-scores: