When should T-Score be used and when should Z-Score be used?

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T-Score and Z-Score are two statistical measures commonly used to standardize and compare data. The choice between using T-Score or Z-Score depends on the type of data being analyzed and the purpose of the analysis.

T-Score, also known as Student's T-Score, is used when the sample size is small (typically less than 30) and the population standard deviation is unknown. It is often used in hypothesis testing and confidence interval calculations.

On the other hand, Z-Score, also known as Standard Score, is used when the sample size is large and the population standard deviation is known. It is commonly used to compare data from different populations and to identify outliers.

In summary, T-Score should be used when working with small sample sizes and unknown population standard deviation, while Z-Score should be used when working with large sample sizes and known population standard deviation. Both measures have their own strengths and should be chosen based on the specific needs of the analysis.

T-Score vs. Z-Score: When to Use Each

Two terms that often confuse students in statistics classes are t-scores and z-scores.

Both are used extensively when performing or constructing , but they're slightly different.

Here's the formula for each:

t-score = (x - μ) / (s/√n)

where:

x: Sample meanμ: Population means: Sample standard

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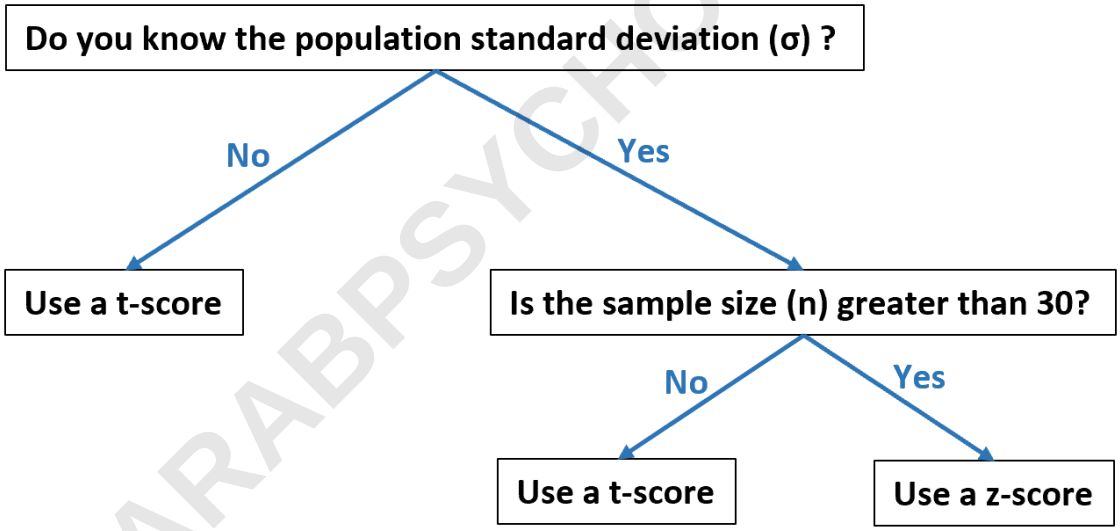
deviationn: Sample size

z-score = (x - μ) / σ

where:

x: Raw data valueμ: Population meanσ: Population standard deviation

This flow chart shows when you should use each, depending on your data:



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The following examples show how to calculate a t-score and z-score in practice.

Example 1: Calculating a T-Score

Suppose a restaurant makes burgers that claim to have a mean weight of μ = 0.25 pounds.

Suppose we take a random sample of n = 20 burgers and find that the sample mean weight is x = 0.22 pounds with a standard deviation of s = 0.05 pounds. Perform a hypothesis test to determine if the true mean weight of all burgers produced by this restaurant is equal to 0.25 pounds.

For this example, we would use a t-score to perform the hypothesis test because neither of the following two conditions are met.

The population standard deviation (σ) is known. (σ is not provided in this example)The sample size is greater than 30. (n = 20 in this example)t-score = (x - μ) / (s/$\sqrt{}$n)t-score = (.22 - .25) / (.05 / $\sqrt{}$20)t- score = -2.68

According to the , the p-value that corresponds to this t-score is 0.01481.

Since this p-value is less than .05, we have sufficient evidence to say that the mean weight of burgers produced at this restaurant is not equal to 0.25 pounds.

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Example 2: Calculating a Z-Score

Suppose a company manufactures batteries that are known to have a lifespan that follows a normal distribution with a mean of μ = 20 hours and a standard deviation of σ = 5 hours.

Suppose we take a random sample of n = 50 batteries and find that the sample mean is x = 21 hours. Perform a hypothesis test to determine if the true mean lifespan of all batteries manufactured by this company is equal to 20 hours.

For this example, we would use a z-score to perform the hypothesis test because the following two conditions are met:

The population standard deviation (σ) is known. (σ is equal to 5 in this example)The sample size is greater than 30. (n = 50 in this example)

Thus, we would calculate the z-score as:

z-score = (x - μ) / σz-score = (21 - 20) / 5z- score = 0.2

According to the , the p-value that corresponds to this

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z-score is 0.84184.

Since this p-value is not less than .05, we don't have sufficient evidence to say that the mean lifespan of all batteries manufactured by this company is different than 20 hours.

The following tutorials offer more information on both t-scores and z-scores:

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