

How can quartiles be found using mean and standard deviation?

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Quartiles are statistical measures that divide a dataset into four equal parts. They can be found using the mean and standard deviation of the dataset. The first quartile (Q1) can be calculated by subtracting the standard deviation from the mean and dividing the result by two. The second quartile (Q2) is simply the mean of the dataset. The third quartile (Q3) can be found by adding the standard deviation to the mean and dividing by two. These quartile values can provide valuable insights into the distribution and spread of the dataset, allowing for a better understanding of the data. By using the mean and standard deviation, quartiles can be easily and accurately determined, providing a useful tool for analyzing and interpreting data.

Find Quartiles Using Mean & Standard Deviation

You can use the following formulas to find the first (Q1) and third (Q3) quartiles of a normally distributed dataset:

$$Q1 = \mu - (.675)\sigma \quad Q3 = \mu + (.675)\sigma$$

Recall that μ represents the population mean and σ represents the population standard deviation.

Also recall that the first quartile represents the 25th percentile of a dataset and the third quartile represents the 75th percentile of a dataset.

The following examples show how to use these formulas in practice.

Example 1: Find Quartiles Using Mean & Standard Deviation

Suppose we have a normally distributed dataset with μ

= 300 and $\sigma = 45$.

We can use the following formulas to calculate the first and third quartiles of the dataset:

$$Q1 = \mu - (.675)\sigma = 300 - (.675)*45 = 269.625$$
$$Q3 = \mu + (.675)\sigma = 300 + (.675)*45 = 330.375$$

We interpret this to mean that 25% of all values in the dataset fall below 269.625 and 75% of all values in the dataset fall below 330.375.

Using these numbers, we could also calculate the interquartile range to be:

$$IQR = Q3 - Q1$$
$$IQR = 330.375 - 269.265$$
$$IQR = 61.11$$

This represents the spread of the middle 50% of values in the dataset.

Example 2: Find Quartiles Using Mean & Standard Deviation

Suppose we have a normally distributed dataset with $\mu = 50$ and $\sigma = 2$.

We can use the following formulas to calculate the first and third quartiles of the dataset:

$$Q1 = \mu - (.675)\sigma = 50 - (.675)*2 = 48.65$$
$$Q3 = \mu + (.675)\sigma = 50 + (.675)*2 = 51.35$$

Using these numbers, we could also calculate the interquartile range to be:

$$IQR = Q3 - Q1$$
$$IQR = 51.35 - 48.65$$
$$IQR = 2.7$$

This represents the spread of the middle 50% of values in the dataset.

The following tutorials offer additional information about the normal distribution and quartiles: