## **Summary:**

# Margin of Error

* Margin of error is a measure of the uncertainty associated with a sample estimate, it is usually expressed as a percentage of the overall sample size, and it lies between 0 and 1.
* It is used to indicate the level of precision of a particular sample's results in polling and survey research.
* It is typically expressed as a percentage of the overall sample size.
* It is determined by the level of confidence desired, the size of the sample, and the variability within the population.
* In general, the larger the sample size, the smaller the margin of error and the more precise the estimate.
* It is important for data analysts to consider sample size, confidence level, and margin of error before running any kind of test or survey to ensure that the results are objective and have a higher chance of being statistically significant.
* The margin of error can also be calculated using the sample size, population size, and confidence level.

# All about margin of error

**Margin of error** is the maximum amount that the sample results are expected to differ from those of the actual population. More technically, the margin of error defines a range of values below and above the average result for the sample. The average result for the entire population is expected to be within that range. We can better understand margin of error by using some examples below.

## **Margin of error in baseball**

The margin of error is also important in marketing. Let’s use A/B testing as an example. **A/B testing** (or split testing) tests two variations of the same web page to determine which page is more successful in attracting user traffic and generating revenue. User traffic that gets monetized is known as the **conversion rate**. A/B testing allows marketers to test emails, ads, and landing pages to find the data behind what is working and what isn’t working. Marketers use the **confidence interval** (determined by the conversion rate and the margin of error) to understand the results.

For example, suppose you are conducting an A/B test to compare the effectiveness of two different email subject lines to entice people to open the email. You find that subject line A: “Special offer just for you” resulted in a 5% open rate compared to subject line B: “Don’t miss this opportunity” at 3%.

Does that mean subject line A is better than subject line B? It depends on your margin of error. If the margin of error was 2%, then subject line A’s actual open rate or confidence interval is somewhere between 3% and 7%. Since the lower end of the interval overlaps with subject line B’s results at 3%, you can’t conclude that there is a statistically significant difference between subject line A and B. Examining the margin of error is important when making conclusions based on your test results.

## **Want to calculate your margin of error?**

All you need is population size, confidence level, and sample size. In order to better understand this calculator, review these terms:

* **Confidence level**: A percentage indicating how likely your sample accurately reflects the greater population
* **Population**: The total number you pull your sample from
* **Sample**: A part of a population that is representative of the population
* **Margin of error**: The maximum amount that the sample results are expected to differ from those of the actual population

In most cases, a 90% or 95% confidence level is used. But, depending on your industry, you might want to set a stricter confidence level. A 99% confidence level is reasonable in some industries, such as the pharmaceutical industry.

After you have settled on your population size, sample size, and confidence level, plug the information into a margin of error calculator like the ones below:

* [Margin of error calculator by Good Calculators (free online calculators)](https://goodcalculators.com/margin-of-error-calculator/)
* [Margin of error calculator by CheckMarket](https://www.checkmarket.com/sample-size-calculator/#sample-size-margin-of-error-calculator)