# How can I calculate confidence intervals in Excel?

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Confidence intervals in Excel can be calculated by using the built-in functions of the software. These intervals provide a range of values that are likely to contain the true population parameter with a certain level of confidence. To calculate confidence intervals in Excel, one needs to have a sample data set and the desired level of confidence. The user can then use the appropriate function, such as CONFIDENCE.NORM for normal data or CONFIDENCE.T for non-normal data, and enter the necessary arguments to generate the confidence interval. This process allows for quick and accurate determination of the range within which the true population parameter is likely to fall, making it a useful tool for data analysis and decision making.

## Calculate Confidence Intervals in Excel

**A confidence interval is a range of values that is likely to contain a population parameter with a certain level of confidence. It is calculated using the following general formula:**

**Confidence Interval = (point estimate) +/- (critical value)*(standard error)**

**This formula creates an interval with a lower bound and an upper bound, which likely contains a population parameter with a certain level of confidence:**

**Confidence Interval =**

**This tutorial explains how to calculate the following confidence intervals in Excel:**

## 1. Confidence Interval for a Mean

## 2. Confidence Interval for a Difference in Means

## 3. Confidence Interval for a Proportion

## 4. Confidence Interval for a Difference in Proportions

## Let's jump in!

### Example 1: Confidence Interval for a Mean

**We use the following formula to calculate a confidence interval for a mean:**

**Confidence Interval = x +/- z*(s/√n)**

**where:**

**x: sample meanz: the chosen z-values: sample standard deviationn: sample size**

**Example: Suppose we collect a random sample of turtles with the following information:**

**Sample size n = 25Sample mean weight x = 300Sample standard deviation s = 18.5**

**The following screenshot shows how to calculate a 95% confidence interval for the true population mean weight**

## of turtles:

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 | Sample size (n) | 25 | | | | | |
| 2 | Sample mean weight (xbar) | 300 | | | | | |
| 3 | Sample standard dev (s) | 18.5 | | | | | |
| 4 | | | | | | | |
| 5 | | | **Formula** | | | | |
| 6 | **95% C.I. Lower Bound** | 292.75 | =$B$2 - NORM.S.INV(0.975)*($B$3/SQRT($B$1)) | | | | |
| 7 | **95% C.I. Upper Bound** | 307.25 | =$B$2 + NORM.S.INV(0.975)*($B$3/SQRT($B$1)) | | | | |
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## The 95% confidence interval for the true population mean weight of turtles is .

### Example 2: Confidence Interval for a Difference in Means

## We use the following formula to calculate a confidence interval for a difference in population means:

## Confidence interval = (x1-x2) +/- t*√((sp2/n1) + (sp2/n2))

## where:

**x1, x2: sample 1 mean, sample 2 meant: the t-critical value based on the confidence level and (n1+n2-2) degrees of freedomsp2: pooled variance, calculated as ((n1-1)s12 + (n2-1)s22) / (n1+n2-2)t: the t-critical valuen1, n2: sample 1 size, sample 2 size**

**Example: Suppose we want to estimate the difference in mean weight between two different species of turtles, so we go out and gather a random sample of 15 turtles from each population. Here is the summary data for each sample:**

**Sample 1:**

**x1 = 310s1 = 18.5n1 = 15**

**Sample 2:**

**x2 = 300s2 = 16.4n2 = 15**

**The following screenshot shows how to calculate a 95% confidence interval for the true difference in population means:**

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | Sample 1 size (n) | 15 | | Sample 2 size (n) | 15 | | | |
| 2 | Sample 1 mean weight (xbar) | 310 | | Sample 2 mean weight (xbar) | 300 | | | |
| 3 | Sample 1 standard dev (s) | 18.5 | | Sample 2 standard dev (s) | 16.4 | | | |
| 4 | | | | | | | | |
| 5 | | | **Formula** | | | | | |
| 6 | $s_p^2$ | 305.605 | =((B1-1)*B3^2+(E1-1)*E3^2)/(B1+E1-2) | | | | | |
| 7 | **95% C.I. Lower Bound** | -3.08 | =($B$2-$E$2)-T.INV.2T(0.05, $B$1+$E$1-2)*SQRT(($B$6/$B$1)+($B$6/$E$1)) | | | | | |
| 8 | **95% C.I. Upper Bound** | 23.08 | =($B$2-$E$2)+T.INV.2T(0.05, $B$1+$E$1-2)*SQRT(($B$6/$B$1)+($B$6/$E$1)) | | | | | |
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**The 95% confidence interval for the true difference in population means is .**

### Example 3: Confidence Interval for a Proportion

**We use the following formula to calculate a confidence interval for a proportion:**

**Confidence Interval = p +/- z*√p(1-p) / n**

**where:**

**p: sample proportionz: the chosen z-valuen: sample size**

**Example: Suppose we want to estimate the proportion of residents in a county that are in favor of a certain**

**law. We select a random sample of 100 residents and ask them about their stance on the law. Here are the results:**

**Sample size n = 100Proportion in favor of law p = 0.56**

**The following screenshot shows how to calculate a 95% confidence interval for the true proportion of residents in the entire county who are in favor of the law:**

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 | Sample size (n) | 100 | | | | | |
| 2 | Proportion (p) | 0.56 | | | | | |
| 3 | | | | | | | |
| 4 | | | **Formula** | | | | |
| 5 | **95% C.I. Lower Bound** | 0.463 | =$B$2-NORM.S.INV(0.975)*SQRT($B$2*(1-$B$2)/$B$1) | | | | |
| 6 | **95% C.I. Upper Bound** | 0.657 | =$B$2+NORM.S.INV(0.975)*SQRT($B$2*(1-$B$2)/$B$1) | | | | |
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**The 95% confidence interval for the true proportion of residents in the entire county who are in favor of the law is .**

### Example 4: Confidence Interval for a Difference in Proportions

**We use the following formula to calculate a confidence interval for a difference in proportions:**

**Confidence interval = (p1-p2) +/- z*√(p1(1-p1)/n1 + p2(1-p2)/n2)**

**where:**

**p1, p2: sample 1 proportion, sample 2 proportionz: the z-critical value based on the confidence leveln1, n2: sample 1 size, sample 2 size**

**Example: Suppose we want to estimate the difference in the proportion of residents who support a certain law in county A compared to the proportion who support the law in county B. Here is the summary data for each sample:**

**Sample 1:**

**n1 = 100p1 = 0.62 (i.e. 62 out of 100 residents support the law)**

**Sample 2:**

## n2 = 100p2 = 0.46 (i.e. 46 our of 100 residents support the law)

## The following screenshot shows how to calculate a 95% confidence interval for the true difference in proportion of residents who support the law between the counties:

| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Sample size 1 (n) | 100 | | Sample size 2 (n) | 100 | | | | |
| 2 | Proportion 1 (p) | 0.62 | | Proportion 2 (p) | 0.46 | | | | |
| 3 | | | | | | | | | |
| 4 | | | **Formula** | | | | | | |
| 5 | **95% C.I. Lower Bound** | 0.024 | =($B$2-$E$2)-NORM.S.INV(0.975)*SQRT($B$2*(1-$B$2)/$B$1+$E$2*(1-$E$2)/$E$1) | | | | | | |
| 6 | **95% C.I. Upper Bound** | 0.296 | =($B$2-$E$2)+NORM.S.INV(0.975)*SQRT($B$2*(1-$B$2)/$B$1+$E$2*(1-$E$2)/$E$1) | | | | | | |
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## The 95% confidence interval for the true difference in proportion of residents who support the law between the counties is .

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