Confidence Interval of a Mean and Sample Size

Confidence interval of a population mean from a sample mean, standard deviation and size (normal approximation), and the sample size for a target margin of error.

Method: Large-sample confidence interval x̄ ± z s/√n (Montgomery, Introduction to Statistical Quality Control, 7th ed. (Wiley, 2012), ch. 4)

Input parameters

Unit system: SI

Parameter	Value	Unit
Sample mean	50.000	
Standard deviation	4.0000	
Sample size	40.000	
Confidence level	95 %	
Target margin of error	1.0000	

Calculated results

Parameter	Value	Unit
Critical value	1.9600	
Margin of error	1.2396	
Lower limit	48.760	
Upper limit	51.240	
Sample size for the target margin	62.000	

Formula and method

$$\bar{x} \pm z\frac{s}{\sqrt{n}}, \quad n = \left(\frac{zs}{E}\right)^2$$

Variables

$\bar{x}$	Sample mean	-
s	Standard deviation	-
n	Sample size	-
$\mathrm{confidence}$	Confidence level	-
E	Target margin of error	-
z	Critical value	-
$z\,s/\sqrt{n}$	Margin of error	-
$\bar{x} - zs/\sqrt{n}$	Lower limit	-
$\bar{x} + zs/\sqrt{n}$	Upper limit	-
n_{req}	Sample size for the target margin	-

Method and standards

Normal sampling distribution.

Assumptions and limits

- Random independent samples.
- The z value is used for any n; under 30 samples the interval is too narrow (Student's t is wider), and a note says so.

References

• Large-sample confidence interval x̄ ± z s/√n (Montgomery, Introduction to Statistical Quality Control, 7th ed. (Wiley, 2012), ch. 4)

Report details

Report reference	FCC-ZA9P-NG5D (the same inputs always give the same reference)
Generated	17 November 2026, 19:44 UTC
Calculator	Confidence Interval of a Mean and Sample Size
Method last reviewed	13 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/general/geometry/confidence-interval-sample-size

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.