Lesson 10-1 Confidence Intervals

# Confidence Intervals

A ***Level C confidence interval*** for a parameter is an interval computed from sample data by a method that has probability C of producing an interval containing the true value of the parameter. Commonly used confidence intervals are 90%, 95% and 99%.

Confidence intervals have the form ***estimate ± margin of error*** and are written in interval notation ***(estimate – margin of error, estimate + margin of error).*** For example, if the estimate for the mean is 68 and the margin of error is 4, the confidence interval would be (64, 72).

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# Confidence Interval for a Population Mean

Draw a SRS of size n from a population having unknown mean µ and known standard deviation σ. A level C confidence interval for µ is

This interval is exact when the population distribution is normal and is approximately correct for large n in other cases.

# Common values for z\*

|  |  |  |  |
| --- | --- | --- | --- |
| Level of confidence | 90% | 95% | 99% |
| z\* | 1.645 | 1.96 | 2.576 |

The margin of error (and thus the confidence interval) gets smaller when

* z\* gets smaller.
* σ gets smaller.
* n gets larger

To determine the **sample size** that will yield a confidence interval for a population mean with a specified margin of error m, set the expression for the margin of error to be less than or equal to m and solve for m.


# Some cautions about confidence intervals and margins of error

* The data needs to come from a SRS. Other types of samples use other methods.
* The formula does not correct for bias or poor design.
* Outliers have a huge effect on confidence intervals. Consider removing them if possible.
* We assume that the population is normal. If n ≥ 15, this is not a big issue if the data is not strongly skewed.
* We assume that we know the standard deviation, which is not really practical.