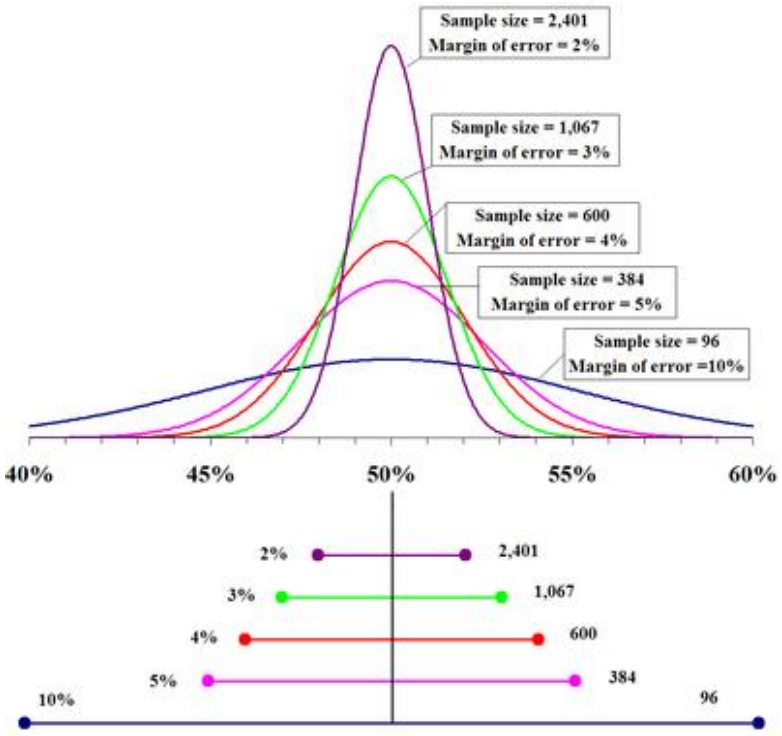
MARGIN OF ERROR IN EXCEL – DEMO NOTES

Pollsters tend to report results with a "margin of error" that is assumed to be within 2-3%. What does this number mean, and why is it assumed to be 2-3%?

The margin of error is the range within which we expect to find our true population. Here is a good visualization from Wikipedia. Notice the relationship between sample size and margin of error:



Our equation for the margin of error is

$$Margin\ of\ error = Z * \frac{\sigma}{\sqrt{n}}$$

Where

$$Z = critical\ value$$

$$\sigma = standard\ deviation$$

$$n = sample\ size$$

$$\frac{\sigma}{\sqrt{n}} = standard\ error$$

For the demonstration, fill out the below columns of the `start` worksheet using these formulas.

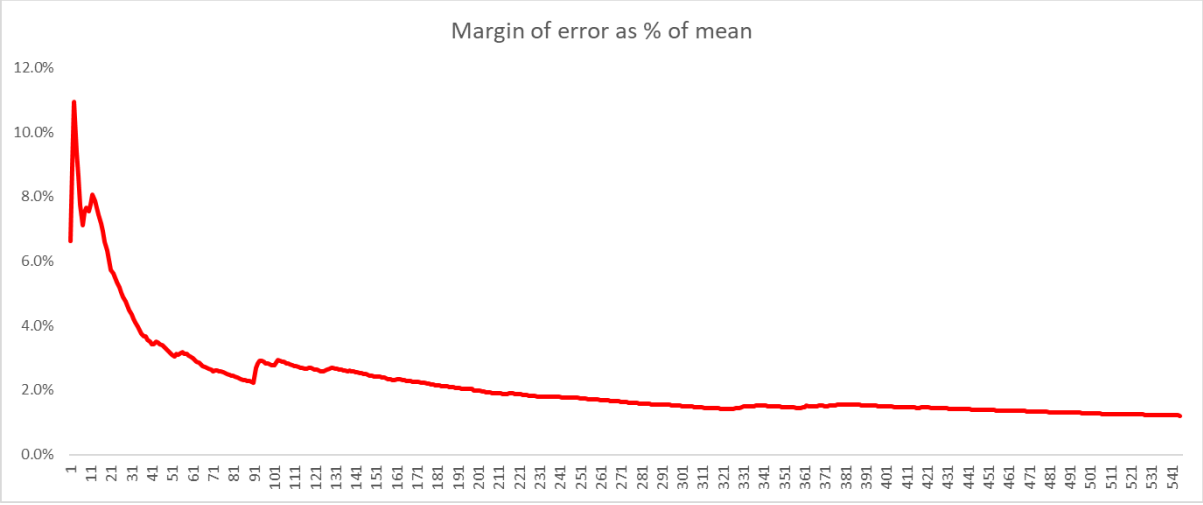
We will take a running mean and standard deviation of our samples, then compute the margin of error given using the above formula. This is for a two-tailed test at the 95% confidence interval.

For very small sample sizes, we will increase our critical value for a more conservative inference test.

Demo file: `margin-of-error.xlsx`

Column position	Column label	Formula
C	Sample mean	`=AVERAGE($B$7:B8)`
D	Standard deviation	`=STDEV.S($B$7:C8)`
E	Standard Error	`=D8/SQRT(A8)`
F	Critical value	`=VLOOKUP(A8,critical_values,2,TRUE)`
G	Margin of error	`=F8*E8`
H	Margin of error as % of mean	`=G8/C8/2`

By default, Column H will be plotted as a line chart expressing the margin of error as a percent of the mean:



This expresses the amount of sampling error there is in the sample mean being reflective of the population. The margin of error dips significantly around n=30, n=60 and n=100. These are empirical results but are generally good rules of thumb as “good, better, best” sample sizes for conducting inferential statistics.