

Statistics
Chapter 19 Extra Practice

Part 1: Calculating the Critical Value

The critical value (z^*) is the z-score of how accurate you want to be (what percent you want for your confidence interval). The steps below should help you calculate your z^* .

Step 1: Draw a normal curve and figure out what is on the left and right of the area you want (which is your confidence percent). You could also use: $\frac{1-\text{confidence}\%}{2}$

Step 2: Calculate the z-score for that percent by using inverse norm \rightarrow invnorm(# you found above, 0, 1)

1. Calculate the critical value for a 95% confidence interval
2. Calculate the critical value for a 90% confidence interval
3. Calculate the critical value for a 92% confidence interval
4. Calculate the critical value for a 88% confidence interval

Part 2: Calculate the Margin of Error

The margin of error is how far you are willing to deviate from the mean. You will need to know your critical value because that helps you find your z-score for that confidence interval you want.

$$\text{Margin of Error} = z^*SD = z^* \sqrt{\frac{pq}{n}}$$

Step 1: Calculate the critical point (z^*) using the steps above

Step 2: Multiply that critical point by the standard deviation $\sqrt{\frac{pq}{n}}$

1. Calculate the margin of error with a 95% confidence interval if 24% of people agree with you out of a total of 72 people sampled.
2. Calculate the margin of error with a 95% confidence interval if 15% of people wake up the first time their alarm goes off out of a total of 204 randomly selected people.
3. Calculate the margin of error with a 90% confidence interval if 34% of people have a cat and a dog in their home out of 105 random pet owners surveyed.
4. Calculate the margin of error with a 80% confidence interval if 42% of knowing who Missy Elliot was in the Super Bowl half-time show out of 300 people randomly surveyed.

Part 3: Calculating the Confidence Interval

The confidence interval tells you the range of percent needed for you to be a certain percent confident. Confidence Intervals are sometimes written as ordered pairs. (low end, high end) → (mean – ME, mean + ME)

Step 1: Determine the margin of error (using the steps above)

Step 2: Add and subtract the margin of error from the mean. That gives you the interval!

1. Calculate a 95% confidence interval if 42% of people surveyed have been to Hawaii out of 200 randomly selected people surveyed.
2. Calculate a 95% confidence interval if 64% of people surveyed have a sibling out of 1005 randomly selected people.
3. Calculate a 90% confidence interval if 37% of people have blonde hair out of 410 people randomly observed.

Part 4: Calculating a Sample Size.

If you are trying to have a specified margin of error and confidence interval, then you need to have a specific sample size. For these problems you will plug in all the values you have, then solve for n .

$$\text{Margin of Error} = z^*SD = z^* \sqrt{\frac{pq}{n}}$$

Step 1: Calculate the critical point (z^*)

Step 2: Plug in your ME, z^* , p , and q .

Step 3: Solve the equation for n

1. Determine the sample size needed if 72% of students can run a mile without stopping, with a margin of error of 3% and a confidence interval of 95%
2. Determine the sample size needed if 61% agree with a tax increase with a margin of error of 1.8% and a confidence interval of 95%
3. Determine the sample size needed if 37% of people are lefties, with a margin of error of 4% and a confidence interval of 90%