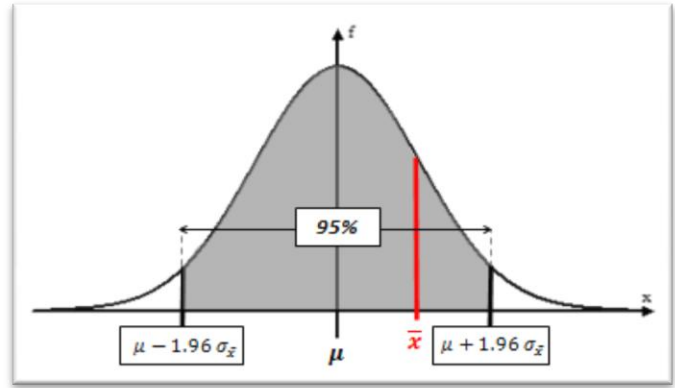


Using the Central Limit Theorem we can construct interval estimates of the population mean with a certain level of confidence. Let's construct a 95% confidence interval.

First notice that there is an approximate area of 0.95 between $z = -1.96$ and $z = 1.96$.

We also know that for relatively large sample sizes that the sample means are normally distributed with a mean of _____ and a standard deviation of _____ (also known as the standard error).



So, there is a 95% chance that sample will have mean somewhere between _____ and _____ which we can write more algebraically as:



Then, with some algebra that can be rewritten as:

This suggests we can say with 95% probability or confidence that the true mean is somewhere between the two calculated boundaries.

1. Try constructing a 95% confidence interval for the true mean price of a gallon of gas given the following information. A lawn company looked at a sample of 30 days out of the previous year and found the mean cost of a gallon of gas was \$2.70. With a 95% confidence what is the mean price of a gallon of gas for the year? You may assume the population standard deviation is \$0.45.
 - a. Determine the Standard Error, _____ = .
 - b. Determine the Margin of Error, _____
 (The Critical Value for 95% Confidence is 1.96)
 - c. Construct the confidence interval . Write the interval 3 different ways (Using \pm , interval notation, and set notation)

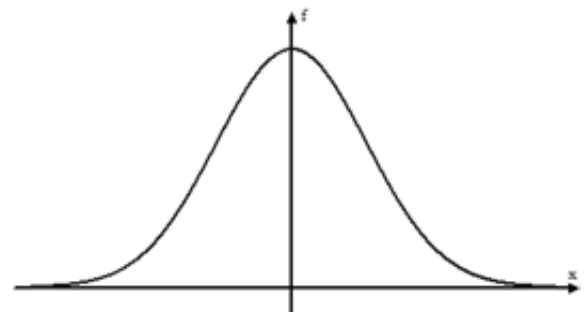
2. It was determined with 95% confidence that 44% would vote for the republican candidate for president in city with an error of $\pm 4\%$. If 2400 voters came to vote in that city, determine the possible range of voters that voted for the republican candidate.
3. According to a recent 2013 government study using a 99% confidence interval, the average 4-year education at a public college or university will cost about \$8,944 per year with a margin of error of $\pm 7.2\%$.
- What is the minimum average cost of tuition?
 - What is the maximum average cost of tuition?



Most commonly confidence intervals of 90%, 95% and 99% are constructed. We will need to determine critical values for each of these which can be done with the “InvNorm(” command on your calculator.

Confidence Level	Critical value	Distribution
90%	1.645	
95%	1.960	
99%	2.576	

4. Using the “InvNorm(” command on your calculator determine the critical value for a confidence interval of 80%.



5. A random sample of 32 students about to graduate want to invite an average of 6 people to the graduation ceremony. If from previous studies the standard deviation has been determined to be 1.5 people, construct a interval estimate such that you would know with 99% confidence the mean number of invitations needed the graduates.
- Determine the Standard Error
 - Determine the Margin of Error.

c. Construct the Confidence Interval.

6. In a random sample of 60 refrigerators, the mean repair cost was \$150.00 and the standard deviation was \$15.50. Construct a 90% confidence interval for the population mean repair cost?
- Determine the Standard Error
 - Determine the Margin of Error.

c. Construct the Confidence Interval.

7. An admissions director wants to estimate the mean cost of books that each student must buy every year for a brochure she is creating. The estimate must be within \$10 and the costs are approximately normally distributed. The standard deviation of book prices is \$35

Determine the minimum required sample size to construct a 90% confidence interval for the population mean.