

## Z Test Formulation

To use the z table for confidence intervals, you will need to know the following:

- The confidence level. This is the probability that the confidence interval will contain the true population mean.
- The standard error of the mean. This is a measure of how much the sample mean is likely to vary from the true population mean.

Once you know these two values, you can look up the z-score in the z table. The z-score is a measure of how many standard deviations away the sample mean is from the true population mean.

To calculate the confidence interval, you will need to multiply the z-score by the standard error of the mean and then add and subtract the result from the sample mean.

For example, suppose you want to construct a 95% confidence interval for the mean height of all adults in the United States. You know that the standard error of the mean is 0.5 inches.

To look up the z-score in the z table, you will need to find the row that corresponds to a confidence level of 95%. This is 1.96.

To calculate the confidence interval, you would multiply the z-score by the standard error of the mean and then add and subtract the result from the sample mean.

Confidence interval = sample mean +/- (z-score \* standard error of the mean)

In this case, the confidence interval would be:

Confidence interval = 67 inches +/- (1.96 \* 0.5 inches)

This means that we are 95% confident that the true mean height of all adults in the United States is between 66.5 inches and 67.5 inches.

Here is a more detailed example of how to use the z table for confidence intervals:

**Step 1:** Determine the confidence level.

The confidence level is the probability that the confidence interval will contain the true population mean. It is typically expressed as a percentage. For example, a 95% confidence interval means that we are 95% confident that the confidence interval will contain the true population mean.

**Step 2:** Find the z-score for the confidence level.

The z-score is a measure of how many standard deviations away the sample mean is from the true population mean. It is calculated using the following formula:

$$z\text{-score} = (\text{sample mean} - \text{true population mean}) / \text{standard error of the mean}$$

We can use the z table to find the z-score for a given confidence level. To do this, we look up the row in the z table that corresponds to the confidence level. The z-score is the value in the table that is closest to the confidence level.

**Step 3:** Calculate the confidence interval.

The confidence interval is calculated using the following formula:

Confidence interval = sample mean +/- (z-score \* standard error of the mean)

This means that we add and subtract the z-score multiplied by the standard error of the mean to the sample mean to find the confidence interval.

**Step 4:** Interpret the confidence interval.

The confidence interval tells us how confident we can be that the true population mean is within a certain range of values. For example, a 95% confidence interval means that we are 95% confident that the true population mean is within the confidence interval.

It is important to note that the confidence interval is only a measure of our confidence. It does not guarantee that the true population mean is within the confidence interval.