

How can I use the Z.TEST function in Excel to perform a statistical hypothesis test?

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The Z.TEST function in Excel is a powerful tool that allows users to perform statistical hypothesis tests with ease. This function calculates the probability of a sample mean being equal to a specified population mean, using the standard normal distribution. It is commonly used in research and data analysis to determine the significance of a sample mean compared to a known population mean. To use the Z.TEST function, the user must input the data range for the sample and the known population mean. The function will then return a p-value that can be compared to a chosen significance level to determine if the null hypothesis should be rejected. This allows for efficient and accurate hypothesis testing, making it a valuable tool for decision-making and drawing conclusions from data.

This article describes the formula syntax and usage of the **Z.TEST** function in Microsoft Excel.

Returns the one-tailed P-value of a z-test.

For a given hypothesized population mean, x, Z.TEST returns the probability that the sample mean would be greater than the average of observations in the data set (array) -- that is, the observed sample mean.

To see how Z.TEST can be used in a formula to compute a two-tailed probability value, see the Remarks section below.

Syntax

Z.TEST(array,x,)

The Z.TEST function syntax has the following arguments:

Array Required. The array or range of data against which to test x.

x Required. The value to test.

Sigma Optional. The population (known) standard deviation. If omitted, the sample standard deviation is used.

Remarks

If array is empty, Z.TEST returns the #N/A error value.

Z.TEST is calculated as follows when sigma is not omitted:

$$\text{Z.TEST}(\text{array}, x, \text{sigma}) = 1 - \text{Norm.S.Dist}((\text{Average}(\text{array}) - x) / (\text{sigma} / \sqrt{n}), \text{TRUE})$$

or when sigma is omitted:

$Z.TEST(array, x) = 1 - \text{Norm.S.Dist}((\text{Average}(array) - x) / (\text{STDEV}(array) / \sqrt{n}), \text{TRUE})$

where x is the sample mean $AVERAGE(array)$, and n is $COUNT(array)$.

Z.TEST represents the probability that the sample mean would be greater than the observed value $AVERAGE(array)$, when the underlying population mean is μ_0 . From the symmetry of the Normal distribution, if $AVERAGE(array) < x$, Z.TEST will return a value greater than 0.5.

The following Excel formula can be used to calculate the two-tailed probability that the sample mean would be further from x (in either direction) than $AVERAGE(array)$, when the underlying population mean is x:

$=2 * \text{MIN}(Z.TEST(array, x, sigma), 1 - Z.TEST(array, x, sigma))$.

Example

Copy the example data in the following table, and paste it in cell A1 of a new Excel worksheet. For formulas to show results, select them, press F2, and then press Enter. If you need to, you can adjust the column widths to see all the data.

Data		
3		
6		
7		
8		
6		
5		
4		
2		
1		
9		
Formula	Description (Result)	Result
$=Z.TEST(A2:A11, 4)$	One-tailed probability-value of a z-test for the data set above, at the hypothesized population mean of 4 (0.090574)	0.090574

Data		
=2 * MIN(Z.TEST(A2:A11,4), 1 - Z.TEST(A2:A11,4))	Two-tailed probability-value of a z-test for the data set above, at the hypothesized population mean of 4 (0.181148)	0.181148
=Z.TEST(A2:A11,6)	One-tailed probability-value of a z-test for the data set above, at the hypothesized population mean of 6 (0.863043)	0.863043
=2 * MIN(Z.TEST(A2:A11,6), 1 - Z.TEST(A2:A11,6))	Two-tailed probability-value of a z-test for the data set above, at the hypothesized population mean of 6 (0.273913)	0.273913