How do I perform one sample and two sample Z-tests in Excel?

Authored by

stats writer

May 12, 2024

The process of performing one sample and two sample Z-tests in Excel involves utilizing the built-in statistical functions to analyze a sample or two samples of data. This allows for the comparison of a population mean to a specific value or the comparison of two population means. The steps typically involve inputting the data into a spreadsheet, calculating the sample mean and standard deviation, determining the appropriate Z-test formula, and using the appropriate function to calculate the Z-score and corresponding p-value. These tests can provide valuable insights and help make informed decisions based on the data being analyzed.

Perform One Sample & Two Sample Z-Tests in Excel

A one sample z-test is used to test whether a population mean is significantly different than some hypothesized value.

A two sample z-test is used to test whether two population means are significantly different from each other.

The following examples show how to perform each type of test in Excel.

Example 1: One Sample Z-Test in Excel

Suppose the IQ in a population is normally distributed with a mean of $\mu = 100$ and standard deviation of $\sigma = 15$.

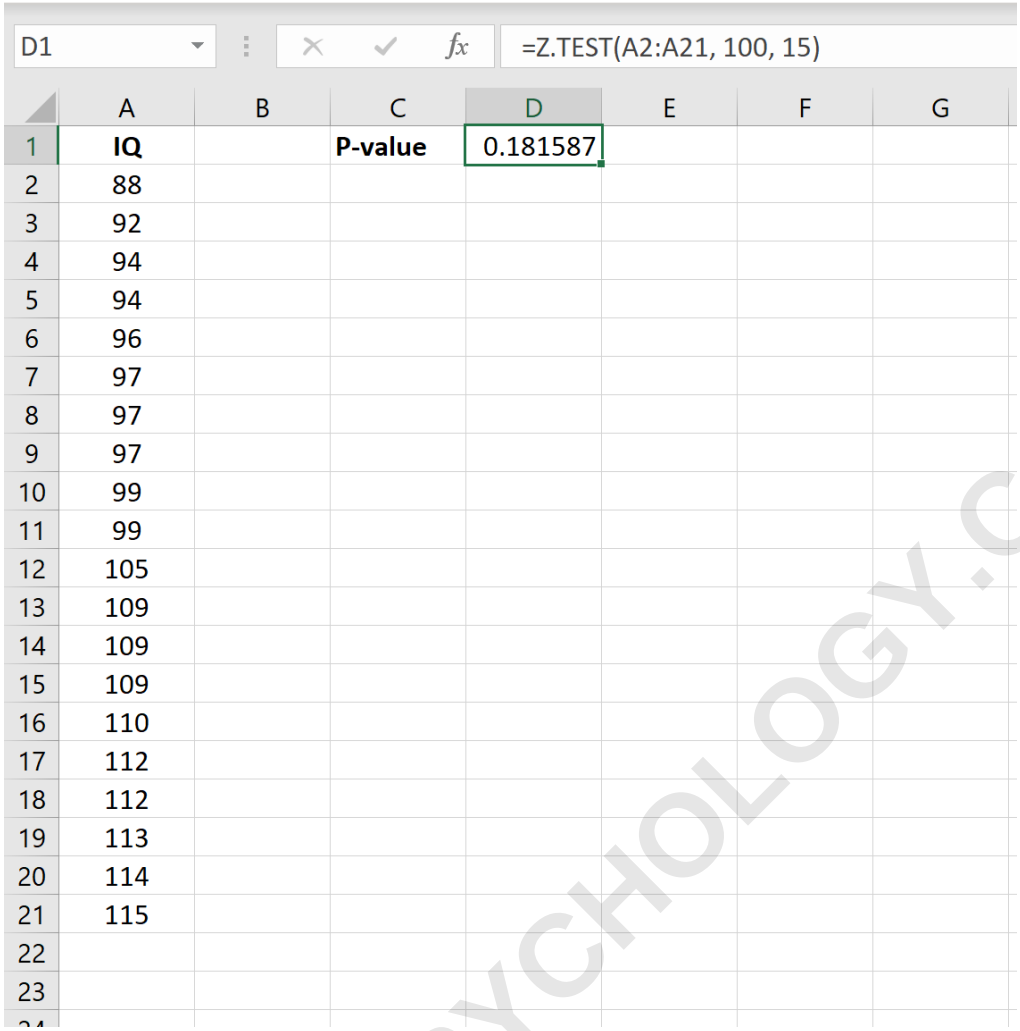
A scientist wants to know if a new medication affects IQ levels, so she recruits 20 patients to use it for one month and records their IQ levels at the end of the

month.

We can use the following formula in Excel to perform a one sample z-test to determine if the new medication causes a significant difference in IQ levels:

=Z.TEST(A2:A21, 100, 15)

The following screenshot shows how to use this formula in practice:



	A	B	C	D	E	F	G
1	**IQ**		**P-value**	0.181587			
2	88						
3	92						
4	94						
5	94						
6	96						
7	97						
8	97						
9	97						
10	99						
11	99						
12	105						
13	109						
14	109						
15	109						
16	110						
17	112						
18	112						
19	113						
20	114						
21	115						
22							
23							

The one-tailed p-value is 0.181587. Since we're performing a two-tailed test, we can multiply this value by 2 to get p = 0.363174.

Since this p-value is not less than .05, we do not have sufficient evidence to reject the null hypothesis.

Thus, we conclude that the new medication does not significantly affect IQ level.

Example 2: Two Sample Z-Test in Excel

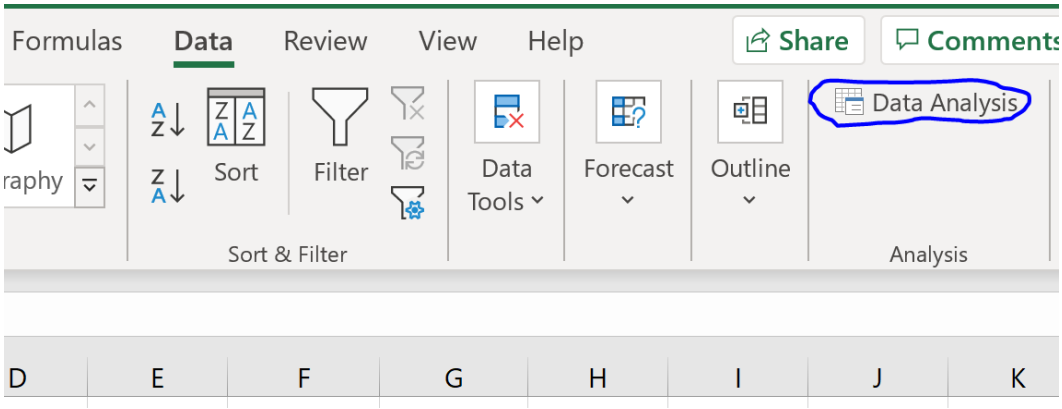
Suppose the IQ levels among individuals in two different cities are known to be normally distributed each with population standard deviations of 15.

A scientist wants to know if the mean IQ level between individuals in city A and city B are different, so she selects a of 20 individuals from each city and records their IQ levels.

The following screenshot shows the IQ levels for the individuals in each sample:

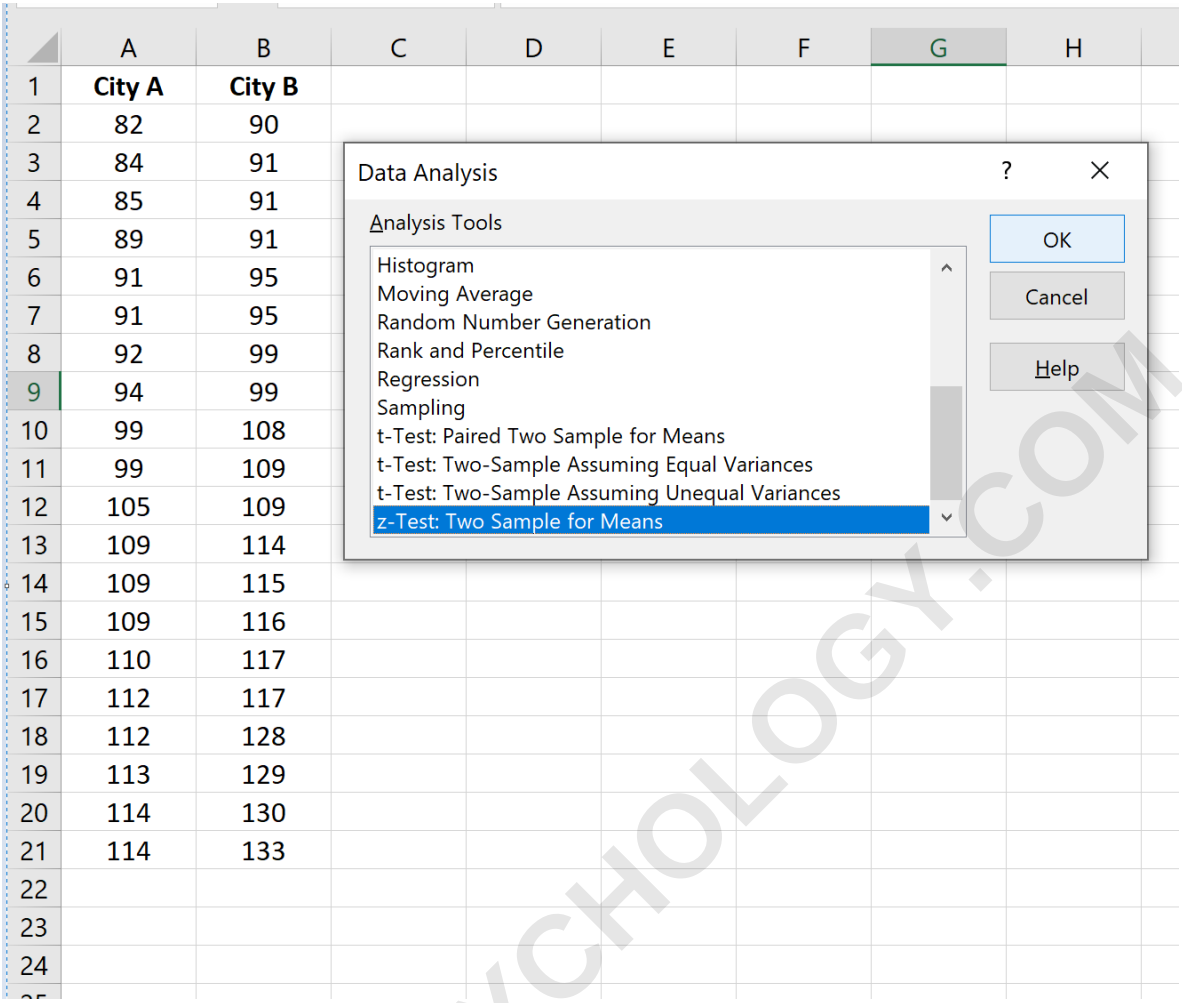
	A	B	C	D	E	F	G
1	**City A**	**City B**					
2	82	90					
3	84	91					
4	85	91					
5	89	91					
6	91	95					
7	91	95					
8	92	99					
9	94	99					
10	99	108					
11	99	109					
12	105	109					
13	109	114					
14	109	115					
15	109	116					
16	110	117					
17	112	117					
18	112	128					
19	113	129					
20	114	130					
21	114	133					
22							
23							
24							
25							

To perform a two sample z-test to determine if the mean IQ level is different between the two cities, click the Data tab along the top ribbon, then click the Data Analysis button within the Analysis group.

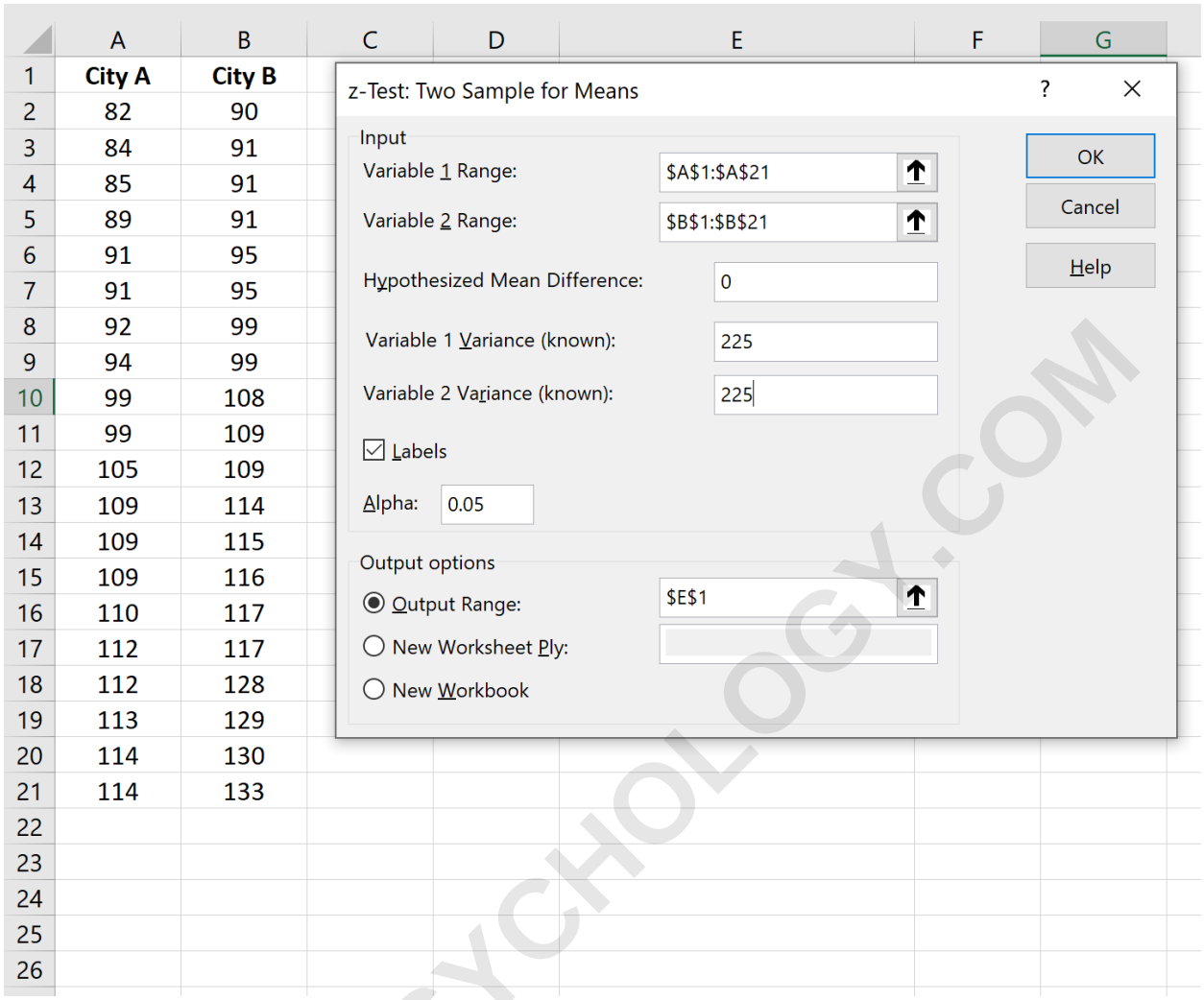


If you don't see Data Analysis as an option, you need to first in Excel.

Once you click this button, select z-Test: Two Sample for Means in the new window that appears:



Once you click OK, you can fill in the following information:



Once you click OK, the results will appear in cell E1:

	A	B	C	D	E	F	G	H
1	**City A**	**City B**			z-Test: Two Sample for Means			
2	82	90						
3	84	91				*City A*	*City B*	
4	85	91			Mean	100.65	108.8	
5	89	91			Known Variance	225	225	
6	91	95			Observations	20	20	
7	91	95			Hypothesized Mean Difference	0		
8	92	99			z	-1.71817		
9	94	99			P(Z<=z) one-tail	0.042883		
10	99	108			z Critical one-tail	1.644854		
11	99	109			P(Z<=z) two-tail	0.085765		
12	105	109			z Critical two-tail	1.959964		
13	109	114						
14	109	115						
15	109	116						
16	110	117						
17	112	117						
18	112	128						
19	113	129						
20	114	130						
21	114	133						
22								
23								
24								

The test statistic for the two sample z-test is -1.71817and the corresponding p-value is .085765.

Since this p-value is not less than .05, we do not have sufficient evidence to reject the null hypothesis.

Thus, we conclude that the mean IQ level is not significantly different between the two cities.

The following tutorials explain how to perform other

common statistical tests in Excel: