

Hypothesis Tests [Excel 2008] Function-ZTEST 1

## Hypothesis Tests using Excel Z.TEST Function

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by  
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Slides and audio at: [www.StatLit.org/pdf/ZTEST-Function-Excel-2008-6up.pdf](http://www.StatLit.org/pdf/ZTEST-Function-Excel-2008-6up.pdf)  
Audio/ZTEST-Function-Excel-2008.mp3

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## Function: ZTEST

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Purpose: Calculate the likelihood of getting the sample statistic (or more extreme) by chance – assuming null hypothesis is true.

FEATURES:  
Assumptions: There is a single population  
Population standard deviation is known.  
Nature: Excel functions automatically updated if data changes.  
Three Arguments (or Inputs):  
1) Range or Array: the range of sample data being tested  
2) Mu-zero: Value of the null hypothesis  
3) Sigma: Standard deviation of population

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## Run Hypothesis Tests from this data: B1:I241

Data for Q1-Q4 (B-E) is Binary: 0=No, 1=Yes.  
Data for Q5-Q6 (F-G) is Ordinal (discrete): 1-5.  
Data for Q7-Q8 (H-I) is Quantitative (ratio).

	A	B	C	D	E	F	G	H	I
1	ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
2	1	0	1	0	0	3	5	67	5
3	2	0	1	0	1	4	1	62	4
4	3	0	1	0	1	3	4	60	5
5	4	0	1	1	0	4	5	60	4
6	5	0	0	1	0	3	1	71	3

Excel instructions and data at:  
[www.StatLit.org/xls/2012Isaacson240Data.xls](http://www.StatLit.org/xls/2012Isaacson240Data.xls)

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## A: From the Formula ribbon, Select "More Functions"

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## B: Select 'Statistical' and then select 'Z.Test'

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## GOAL

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How to conduct a one-population hypothesis-test using the Excel 2008 Z.TEST function in two situations:

- 1) Test of Measurements
- 2) Test of Proportions

Assumption: Population standard deviation is known.  
Notation for the three arguments of Z.TEST function:

- Array: the range of the sample data.
- X: The value, mu, of the null hypothesis.
- Sigma: The population standard deviation.

**1a Z.Test for Measures:  
Sigma is known (entered)**

Sample mean is 63  
P-value is 0.315...

**1b Z.Test for Measures:  
Sigma is estimated from sample**

Sample standard deviation is 3.605551  
Note: the p-value is still 0.315 (with n=3)

**1c Z.Test for Measures:  
Summary**

The sample standard deviation can be used to estimate the population standard deviation.

There is no adjustment for this new source of variation. This modified Z.TEST is not the same as a T-TEST.

Using the sample standard deviation for small samples ( $n < 30$ ) can result in p-values that smaller than those given by a T-Test. This increases false positives.

**2a: Test for Proportions  
Sigma is entered**

This analysis assumes the data are zeros and ones. In this case, the mean is always the proportions of ones.  
Sample mean is 0.28  
P-value is 0.1574...

**2b: Test for Proportions  
Sigma is estimated from sample**

Sample mean (p) is 0.28.  $p*q = 0.2016$   
Sample Std Dev =  $\text{Sqrt}(p*q) = \text{Sqrt}(0.2016) = .4495$   
P-value is 0.1574....

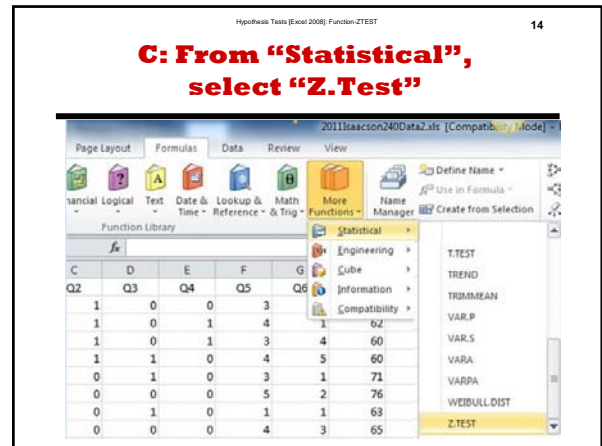
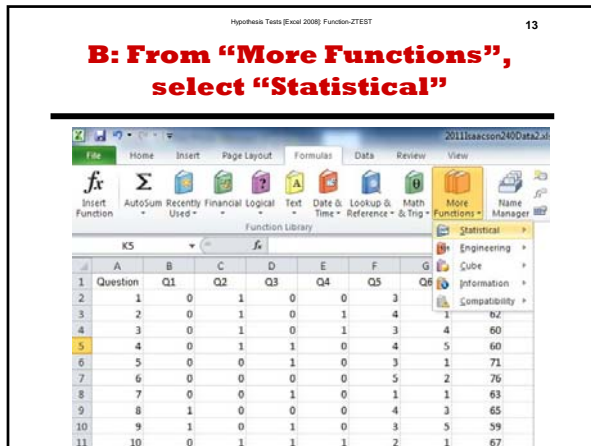
**Conclusions**

Excel 2008 offers a single-population Z-Test function for measures and proportions. It does not offer a single-population T-Test.

To use this function for proportions, the outcomes must be coded as zero and one.

Excel can do this test when the proportions are coded differently from zero and one. Showing how is beyond the scope of this presentation.

Excel does allow for two-tail tests, but that is more involved. See the Excel Help system for details.



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**2c Z-Test for Proportions:  
Summary**

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Z.TEST is a good hypothesis test of proportions in a single population if the data is coded as zero and one.