

# How can I use the Arcsine Transformation in Excel and what are some examples of its application?

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## RECOMMENDED CITATION

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The Arcsine Transformation is a mathematical tool that is used to transform non-linear data into a linear form. In Excel, this transformation can be applied using the "ARCSIN" function. This function takes the arcsine of a given value and returns the corresponding angle in radians.

The Arcsine Transformation is commonly used in statistics and data analysis to convert skewed data or data with a non-linear relationship into a linear form. This allows for easier interpretation and analysis of the data. It is particularly useful in situations where the data is bounded between 0 and 1, such as in proportions or percentages.

For example, if we have a dataset with values ranging from 0 to 1 representing the likelihood of rainfall in a particular month, the data may not follow a linear pattern. By applying the Arcsine Transformation to this data, we can transform it into a linear form, making it easier to analyze and make predictions.

Another example of its application is in the field of genetics, where the Arcsine Transformation is used to analyze data from experiments involving proportions or ratios, such as the frequency of certain genetic traits in a population.

In conclusion, the Arcsine Transformation in Excel is a powerful tool for converting non-linear data into a linear form, making it easier to analyze and interpret. Its applications range from statistics and data analysis to genetics and beyond, making it a valuable tool for anyone working with data.

## **Arcsine Transformation in Excel (With Examples)**

**An arcsine transformation can be used to "stretch out" data points that range between the values 0 and 1.**

**This type of transformation is typically used when dealing with proportions and percentages.**

**We can use the following formula to perform an arcsine transformation in Excel:**

**#perform arcsine transformation on value in cell A1**

## =ASIN(SQRT(A1))

The following examples shows how to perform an arcsine transformation on datasets in Excel.

Example 1: Arcsine Transformation of Values in Range 0 to 1

Suppose we have the following dataset in Excel:

	A	B	C	D	E	F	G	H
1	<b>Data</b>							
2	0.1							
3	0.12							
4	0.15							
5	0.19							
6	0.22							
7	0.25							
8	0.27							
9	0.34							
10	0.47							
11	0.5							
12	0.56							
13	0.66							
14	0.68							
15								
16								
17								
18								
19								
20								
21								
22								
23								

We can use the following formula to perform an arcsine

## transformation on the value in cell A2:

	A	B	C	D	E	F
1	Data	Arcsine Transformed Data				
2	0.1	0.321751				
3	0.12					
4	0.15					
5	0.19					
6	0.22					
7	0.25					
8	0.27					
9	0.34					
10	0.47					
11	0.5					
12	0.56					
13	0.66					
14	0.68					
15						
16						
17						
18						
19						
20						
21						

We can then hover over the bottom right corner of cell A2 until a tiny plus sign "+" appears, then double click it to copy and paste the arcsine formula down to every cell in column B:

	A	B	C	D	E	F
1	<b>Data</b>	<b>Arcsine Transformed Data</b>				
2	0.1	0.321751				
3	0.12	0.353742				
4	0.15	0.397699				
5	0.19	0.451027				
6	0.22	0.488205				
7	0.25	0.523599				
8	0.27	0.546401				
9	0.34	0.622533				
10	0.47	0.755380				
11	0.5	0.785398				
12	0.56	0.845543				
13	0.66	0.948263				
14	0.68	0.969532				
15						
16						
17						
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19						
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22						

### Example 2: Arcsine Transformation of Values Outside Range 0 to 1

**Note that the arcsine transformation only works on values between the range of 0 to 1. So, if we have a vector with values outside of this range then we need to first convert each value to be in the range of 0 to 1.**

**For example, suppose we have the following dataset in Excel:**

	A	B	C	D	E	F
1	<b>Data</b>					
2	2					
3	7					
4	12					
5	13					
6	16					
7	22					
8	28					
9	30					
10	34					
11	35					
12	38					
13	41					
14	54					
15						
16						
17						
18						
19						
20						
21						

**Before we perform an arcsine transformation on the values, we must first divide each value by the max value in the dataset:**

	A	B	C	D	E	F
1	Data	Data / Max (Data)				
2	2	=A2/MAX(\$A\$2:\$A\$14)				
3	7	0.129630				
4	12	0.222222				
5	13	0.240741				
6	16	0.296296				
7	22	0.407407				
8	28	0.518519				
9	30	0.555556				
10	34	0.629630				
11	35	0.648148				
12	38	0.703704				
13	41	0.759259				
14	54	1				
15						
16						
17						
18						
19						
20						
21						
22						

Now each value in the dataset ranges between 0 and 1. We can then perform an arcsine transformation on the values in column B:

C2            *fx*    =ASIN(SQRT(B2))

	A	B	C	D	E	F
1	<b>Data</b>	<b>Data / Max (Data)</b>	<b>Arcsine Transformed Data</b>			
2	2	0.037037	0.193658			
3	7	0.129630	0.368312			
4	12	0.222222	0.490883			
5	13	0.240741	0.512839			
6	16	0.296296	0.575591			
7	22	0.407407	0.692268			
8	28	0.518519	0.803921			
9	30	0.555556	0.841069			
10	34	0.629630	0.916526			
11	35	0.648148	0.935804			
12	38	0.703704	0.995205			
13	41	0.759259	1.057957			
14	54	1	1.570796			
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