

Microsoft Excel 2019

Data Analysis and Business Modeling

SIXTH EDITION

Wayne L. Winston



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Microsoft Excel 2019 Data Analysis and Business Modeling

Sixth Edition

Wayne L. Winston

Microsoft Excel 2019 Data Analysis and Business Modeling, Sixth Edition

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*To Vivian, Jen, and Greg, You are all so great, and I love all of you
so much!*

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The INDEX function

Questions answered in this chapter:

- I have a list of distances between U.S. cities. How do I write a function that returns the distance between, for example, Seattle and Miami?
- Is there a way I can write a formula that references the entire column containing the distances between each city and Seattle?

Syntax of the INDEX function

The **INDEX** function allows you to return the entry in any row and column within an array of numbers. The most commonly used syntax for the **INDEX** function is the following:

INDEX(Array, Row Number, Column Number)

To illustrate, the formula **INDEX(A1:D12, 2, 3)** returns the entry in the second row and third column of the array A1:D12. This entry is the one in cell C2.

Answers to this chapter's questions

I have a list of distances between U.S. cities. How do I write a function that returns the distance between, for example, Seattle and Miami?

The file named INDEX.xlsx (see Figure 4-1) contains the distances between eight U.S. cities. The range C10:J17, which contains the distances, is named *distances*.

	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4		Boston-Denver	1991			T Dist to Seattle	15221			
5		Seattle- Miami	3389							
6										
7										
8										
9			Boston	Chicago	Dallas	Denver	LA	Miami	Phoenix	Seattle
10	1	Boston	0	983	1815		3036	1539	2664	2612
11	2	Chicago	983	0	1205	1050	2112	1390	1729	2052
12	3	Dallas	1815	1205	0	801	1425	1332	1027	2404
13	4	Denver	1991	1050	801	0	1174	2100	836	1373
14	5	LA	3036	2112	1425	1174	0	2757	398	1909
15	6	Miami	1539	1390	1332	2100	2757	0	2359	3389
16	7	Phoenix	2664	1729	1027	836	398	2359	0	1482
17	8	Seattle	2612	2052	2404	1373	1909	3389	1482	0

FIGURE 4-1 You can use the **INDEX** function to calculate the distance between cities.

Suppose that you want to enter in a cell the distance between Boston and Denver. Because distances from Boston are listed in the first row of the array named *distances*, and distances to Denver are listed in the fourth column of the array, the appropriate formula is **INDEX(distances, 1, 4)**. The results show that Boston and Denver are 1,991 miles apart. Similarly, to find the (much longer) distance between Seattle and Miami, you would use the formula **INDEX(distances, 6, 8)**. Seattle and Miami are 3,389 miles apart.

Imagine that the Seattle Seahawks NFL team is embarking on a road trip in which they play games in Phoenix, Los Angeles, Denver, Dallas, and Chicago. At the conclusion of the road trip, the Seahawks return to Seattle. Can you easily compute how many miles they travel on the trip? As you can see in Figure 4-2, you simply list the cities the Seahawks visit (8-7-5-4-3-2-8) in the order they are visited, starting and ending in Seattle, and copy from D21 to D26 the formula **INDEX(distances, C21, C22)**. The formula in D21 computes the distance between Seattle and Phoenix (city number 7), the formula in D22 computes the distance between Phoenix and Los Angeles, and so on. The Seahawks will travel a total of 7,112 miles on their road trip. Just for fun, I used the **INDEX** function to show that the Miami Heat travel more miles during the NBA season than any other team.

	C	D
19	Road Trip!!	
20	City	Distance
21	8	1482
22	7	398
23	5	1174
24	4	801
25	3	1205
26	2	2052
27	8	
28	Total	7112

FIGURE 4-2 Distances for a Seattle Seahawks road trip.

Is there a way I can write a formula that references the entire column containing the distances between each city and Seattle?

The **INDEX** function makes it easy to reference an entire row or column of an array. If you set the row number to **0**, the **INDEX** function references the listed column. If you set the column number to **0**, the **INDEX** function references the listed row in the array. To illustrate, suppose you want to total the distances from each listed city to Seattle. You could enter either of the following formulas:

```
SUM(INDEX(distances, 8, 0))
SUM(INDEX(distances, 0, 8))
```

The first formula totals the numbers in the eighth row (row 17) of the *distances* array; the second formula totals the numbers in the eighth column (column J) of the *distances* array. In either case, you find that the total distance from Seattle to the other cities is 15,221 miles, as you can see in Figure 4-1.

Problems

1. Use the **INDEX** function to compute the distance between Los Angeles and Phoenix and the distance between Denver and Miami.
2. Use the **INDEX** function to compute the total distance from Dallas to the other seven cities listed in Figure 4-1.
3. Jerry Jones and the Dallas Cowboys are embarking on a road trip that takes them to Chicago, Denver, Los Angeles, Phoenix, and Seattle. How many miles will they travel on this road trip?
4. The file named Product.xlsx contains monthly sales for six products. Use the **INDEX** function to compute the sales of Product 2 in March. Use the **INDEX** function to compute total sales during April.
5. The file named NBAdistances.xlsx shows the distance between any pair of NBA arenas. Suppose you begin in Atlanta, visit the arenas in the order listed, and then return to Atlanta. How far would you travel?
6. Use the **INDEX** function to solve Problem 10 of Chapter 3, “Lookup functions.” Here is the problem again: The file Employees.xlsx contains the ranking that each of 35 workers has given (on a 0–10 scale) to three jobs. The file also gives the job to which each worker is assigned. Use a formula to compute each worker’s ranking for the job to which the worker is assigned.

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