Using Excel's [Google Sheets', and Numbers'] COUNTIF Function to make a Frequency Distribution Table for Discrete Data

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Let's say we work for a Volkswagen car dealership, and our boss asks us to count how many cars of each Volkswagen model the dealership sold last month. This dealership sells five Volkswagen models: **EOS**, Golf Mk6, Jetta, Passat B6, and Passat B7.

Our boss gives us a list of the Volkswagen models sold last month. We enter that list into our spreadsheet. We use Column A, as in Figure 1 below, and type in a new Column Heading "Volkswagen Model." We then type in the names of each model that was sold last month in cells A2 through A12. Note that these data are discrete measurements (we can sell one car or five cars, but not 2.678 cars).

To make a Frequency Distribution Table from these data, the next thing we do is create a new column. We can call it "Categories," as illustrated in Column C of Figure 1 below. And in the "Categories" column, we need to enter a list of our categories, which in this case are the five models of Volkswagens.

Next, we create another column that we call "Absolute Frequency," as illustrated in Column D.

	A	B	C	D
1	**Volkswagen Model**		**Categories**	**Absolute Frequency**
2	EOS		EOS	=COUNTIF(A2:A12,C2)
3	Golf Mk6		Golf Mk6	
4	Passat B6		Jetta	
5	Golf Mk6		Passat B6	
6	EOS		Passat B7	
7	EOS			
8	Jetta			
9	Golf Mk6			
10	Passat B6			
11	Passat B6			
12	Passat B6			

Figure 1 - Excel & Google Sheets

	A	B	C	D
1	**Volkswagen Model**		**Categories**	**Absolute Frequency**
2	EOS		EOS	...
3	Golf Mk6		Golf Mk6	
4	Passat B6		Jetta	
5	Golf Mk6		Passat B6	
6	EOS		Passat B7	
7	EOS			
8	Jetta			
9	Golf Mk6			
10	Passat B6			
11	Passat B6			
12	Passat B6			

fx ∨ COUNTIF ▾ (A2:A12 ▾) , C2 ▾)

Figure 1 - Apple Numbers

To make our Frequency Distribution, we are going to use the COUNTIF function. To use any function, you start by typing an equal sign = in the cell where you are building your function. Immediately after typing the equal sign, you type the name of the function, which in this case is COUNTIF, for example, =COUNTIF(A2:A12,C2)

The COUNTIF function requires two arguments, enclosed in parentheses and separated by a comma. The first argument tells the function **where to look**, and the second argument tells the function **what to count** from where it looked.

As shown in Figure 1, in this example, we're telling the function to look in cells A2 through A12 (that's why we wrote A2:A12 in the formula), and we're telling the function to count EOS models, which is the type of category that's listed in cell C2 (that's why we wrote C2 in the formula). We make sure we have a comma in between the two arguments, and after typing the formula, we press return or enter and get our result!

As shown in Figure 2, our COUNTIF formula found three instances of EOS in cells A2 through A12. Now, we need to repeat the process for each of other categories. For example, in cell D3, we type another COUNTIF formula; this time it's =COUNTIF(A2:A12,C3) because we want to again look in cells A2 through A12, but this time we want the function to count Golf Mk6 models (i.e., the category in the C3 cell).

Then, in cell D4, we'd enter the formula =COUNTIF(A2:A12,C4) to count the Jetta models, and we'd keep counting each category until we've counted all of our categories. When we're finished, we have an Absolute Frequency Distribution Table for our discrete data.

	A	B	C	D
1	**Volkswagen Model**		**Categories**	**Absolute Frequency**
2	**EOS**		EOS	3
3	**Golf Mk6**		Golf Mk6	3
4	**Passat B6**		Jetta	1
5	**Golf Mk6**		Passat B6	4
6	**EOS**		Passat B7	0
7	**EOS**			
8	**Jetta**		Total	=SUM(D2:D6)
9	**Golf Mk6**			
10	**Passat B6**			
11	**Passat B6**			
12	**Passat B6**			

**Figure 2 -
Excel & Google Sheets**

	A	B	C	D
1	**Volkswagen Model**		**Categories**	**Absolute Frequency**
2	**EOS**		EOS	3
3	**Golf Mk6**		Golf Mk6	3
4	**Passat B6**		Jetta	1
5	**Golf Mk6**		Passat B6	4
6	**EOS**		Passat B7	0
7	**EOS**			
8	**Jetta**		Total	...
9	**Golf Mk6**			
10	**Passat B6**			
11	**Passat B6**			
12	**Passat B6**			

fx ∨ = SUM ▾ D2:D6 ▾

**Figure 2 -
Apple Numbers**

Finally, we want to create a Total, which will help us check our work to make sure we've counted everything -- and it will prepare us for making a Relative Frequency Distribution. We can use the SUM function to get our Total.

As shown in Figure 2 above, we type the word Total in a blank cell, and then in another blank cell, we first type an equal sign followed by the word SUM and an open parenthesis. Then, we can either select the cells we want to sum, or we can type the name of the cells separated by a colon, for example, =SUM(D2:D6) and close our parentheses. When we press return (or enter), we get the sum.

	A	B	C	D	E
1	Volkswagen Model		Categories	Absolute Frequency	Relative Frequency
2	EOS		EOS	3	=D2/D8
3	Golf Mk6		Golf Mk6	3	
4	Passat B6		Jetta	1	
5	Golf Mk6		Passat B6	4	
6	EOS		Passat B7	0	
7	EOS				
8	Jetta		Total	11	
9	Golf Mk6				
10	Passat B6				
11	Passat B6				
12	Passat B6				

**Figure 3 -
Excel & Google Sheets**

	A	B	C	D	E
1	Volkswagen Model		Categories	Absolute Frequency	Relative Frequency
2	EOS		EOS	3	...
3	Golf Mk6		Golf Mk6	3	
4	Passat B6		Jetta	1	
5	Golf Mk6		Passat B6	4	
6	EOS		Passat B7	0	
7	EOS				
8	Jetta		Total	11	
9	Golf Mk6				
10	Passat B6				
11	Passat B6				
12	Passat B6				

`· fx ˅  D2 ▾ ÷ D8  ✕ ✓`

NOTE: In Apple Numbers, when you type the formula =D2/D8, the formula bar will show with the division symbol ÷. That's ok!

**Figure 3 -
Apple Numbers**

Now we want to make a Relative Frequency Distribution Table.

First, we enter the column heading "Relative Frequency" as shown in Column E of Figure 3 above. Then, to compute each category's relative frequency, we type an equal sign and then the formula to divide the category's Absolute Frequency by the Total.

For example, to find the Relative Frequency of EOS models, we use the formula =D2/D8 because D2 is the Absolute Frequency of EOS models, and D8 is the total. To find the Relative Frequency of the category Golf Mk6, we use the formula =D3/D8 because D3 is the Absolute Frequency of Golf Mk6 models, and D8 is our total. We continue computing Relative Frequencies for each of our categories.

To adhere to good scientific practice, we want to always use three decimals places for our Relative Frequencies (and for any other time we use decimals). We can use the tool provided by each of our data management systems. Those tools are highlighted in yellow in Figure 4 (on the next page).

Figure 4 - Excel

	Volkswagen Model		Categories	Absolute Frequency	Relative Frequency
1	Volkswagen Model		Categories	Absolute Frequency	Relative Frequency
2	EOS		EOS	3	0.273
3	Golf Mk6		Golf Mk6	3	0.273
4	Passat B6		Jetta	1	0.091
5	Golf Mk6		Passat B6	4	0.364
6	EOS		Passat B7	0	0
7	EOS				
8	Jetta		Total	11	
9	Golf Mk6				
10	Passat B6				
11	Passat B6				
12	Passat B6				

Figure 4 - Google Sheets

	A Volkswagen Model	B	C Categories	D Absolute Freque	E Relative Frequency
1	Volkswagen Model		Categories	Absolute Freque	Relative Frequency
2	EOS		EOS	3	0.273
3	Golf Mk6		Golf Mk6	3	0.273
4	Passat B6		Jetta	1	0.091
5	Golf Mk6		Passat B6	4	0.364
6	EOS		Passat B7	0	0
7	EOS				
8	Jetta		Total	11	
9	Golf Mk6				
10	Passat B6				
11	Passat B6				
12	Passat B6				

Figure 4 - Apple Numbers

	Volkswagen Model		Categories	Absolute Frequency	Relative Frequency
1	Volkswagen Model		Categories	Absolute Frequency	Relative Frequency
2	EOS		EOS	3	0.273
3	Golf Mk6		Golf Mk6	3	0.273
4	Passat B6		Jetta	1	0.091
5	Golf Mk6		Passat B6	4	0.364
6	EOS		Passat B7	0	0.000
7	EOS				
8	Jetta		Total	11	

Finally, we want to create a Total for our Relative Frequency Distribution that will help us check our work. We can again use the SUM function to sum our relative frequencies. If our relative frequencies are calculated correctly, they will add up to 1.000

In a blank cell, E8, we first type an equal sign followed by the word SUM. Then, we can either select the cells we want to sum, or we can type the name of the cells in parentheses separated by a colon, for example =SUM(E2:E6) When we press return (or enter) we get the sum.

Notice that Figure 4 does not contain the Total for our Relative Frequency Distribution Table, but your Frequency Distribution Table should contain that Total. Remember we always want to use three decimal places when we use decimals (e.g., 1.000).

And we have now have now created a Frequency Distribution Table for Discrete Data!