

Lab 4, Functions and Charts

CS 0131, Software for Personal Computing
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We’ve seen how Excel makes repeated simple calculations easy, but we can do so much more with functions! Much like we design the relationship between the inputs and outputs of our entire spreadsheet in order to end up conveying what we wish to convey, functions also relate input values to output values. The inputs to functions are often called parameters or arguments. Different functions may require different numbers or types of arguments.

As we design our spreadsheet, functions are building blocks we can use along the way to help us reach our goal more efficiently. Excel has hundreds of built-in functions, some of which perform pretty complicated calculations. Fortunately, using a function in Excel is as easy as calling it by name; ScreenTips will help you fill in the rest!

Excel also has some powerful charting tools to help you visualize data. We’ll be talking more about charts in future lectures, but we’ll take a look today at some of the basics that go into the process of converting some or all of your tabular data into easy-to-understand pictorial representations.

1 Managing Salaries

You work in the Human Resources Department at Central Nevada College. It’s a small school, pretty much the only thing in the middle of this fictitious version of Nevada, but somehow it’s grown big enough to have six full-time faculty members in addition to all of its part-time faculty. (*You can’t believe it either.*)

You are preparing a spreadsheet to calculate salary bonuses for the upcoming Academic Year based on your faculty’s performance ratings and annual raises based on years of employment.

1. Download **salaries.xlsx** from today’s entry in the “Schedule” page of the course website and open the workbook.
2. In cell **B4**, next to the label “Today:”, enter the formula `=TODAY()` to get today’s date, 2/13/2013.

Remember: When we are calling a function with no arguments, we still need to use the parentheses. This is how we indicate to Excel that **TODAY** represents a function, and not a string of plain text (which would be surrounded by quotation marks) or a named range (which would have no adornment).

3. Calculate the years of employment for each faculty member:
 - a. In cell **D11**, begin by calling the **YEARFRAC()** function. This function takes two required arguments, *start_date* and *end_date*.
 - b. For the *start_date* argument, select the date on which Troy Sentner was hired, which is in cell **B11**.
 - c. For the *end_date* argument, select today’s date, which you put in cell **B4**.

Note: Since Excel stores dates as numbers which are day counts, we could of course simply divide the difference between these two dates by 365; however, `YEARFRAC()` provides better accuracy since it accounts for leap years.

- d. Ask yourself whether each of these cell references should be relative or absolute. In particular, you want this calculation to use the *start_date* which corresponds to each faculty member, but the same *end_date*, today. Use `F4` to specify this appropriately for each argument.
- e. Once you're satisfied with your formula, fill it down to the other faculty members' records.

Hint: Anytime you apply a new formula, it's a good idea to perform a "sanity check" to ensure you're getting the results you expect. If, for example, you're seeing that a faculty member has been employed for hundreds of years, you've probably made a mistake! Best to fix it before you move on!

4. Enter the minimum ratings required for each of the following bonus levels into cells **A21:B25**:

	A	B
21	1	\$0
22	2	\$100
23	3	\$250
24	4	\$500
25	5	\$1000

5. Select the range **A21:B25** containing the breakpoints you just created, and use the Name Box to give this range the name **bonus**.

6. Calculate the bonus for each faculty member based on their rating:

- a. In cell **F11**, begin by calling the `VLOOKUP()` function. This function takes three required arguments — *lookup_value*, *table_array*, and *col_index_num* — and one optional argument, *range_lookup*.
- b. For the *lookup_value* argument, select Troy Sentner's rating, which is in cell **E11**.
- c. For the *table_array* argument, type **bonus** since you named the range in which your breakpoints exist.

Bonus: Because we named this range, we can use this name without worrying about absolute or relative references. The name will always refer to the same range of cells, regardless of where you're referencing it. **Neat!**

- d. For the *col_index_num* argument, enter 2 because the bonus amounts you wish to extract come from the second column in your source array.
- e. For the *range_lookup* argument, enter **true** because we want our breakpoints to be used to match ranges, not exact matches.
- f. Fill this formula down to the other faculty members' records and check your results.

7. Faculty members who have five or more years of employment are eligible for the "high" raise of 3.25% while those with less should receive the "low" 2.00% raise:

- a. In cell **G11**, begin by calling the `IF()` function.
- b. Recall that the first argument to `IF` is *logical_test*, a conditional statement on which the evaluation of the formula is predicated. For Troy Sentner, we'll compare whether his years of employment, in cell **D11**, is greater than or equal to (that is, `>=`) the threshold of 5 years found in cell **B5**.
Again, think ahead to when you will fill this formula down and specify your relative or absolute addressing appropriately, as you should always be doing. Also keep in mind that the logical test is altogether one argument.
- c. For the second argument, if the condition is true, then the faculty member is eligible for the "high" raise of 3.25%. In this case, we should multiply the current salary in cell **C11** by the "High Year Rate" in cell **B6**.

- d. For the third argument, if the condition is false, we should instead multiply the current salary by the “Low Year Rate” in cell **B7**.
 - e. Fill this formula down to the other faculty members’ records and check your results.
8. In column **H**, compute the new salary for each faculty member by adding together the corresponding values in columns **C**, **F**, and **G**. That is, the new salary is equal to the current salary, plus the rating-based bonus, plus the raise.
 9. Type your name in cell **D4**, under the label “Prepared by:”, and save all changes to your workbook.

2 Charting Enrollment

Since Central Nevada College is so small, the Human Resources Department is also the Office of the Registrar, and your work frequently switches between the two roles.

You’ve already gathered the enrollment data from all of your departments for the last four Academic Years, including yearly totals and the average enrollment for each major. But you’ve got to present this data tomorrow to Dr Roberts, the college president, and he’s a “visual guy”... so you want to make some charts to help summarize this data in compact visual representations.

1. Download **majors.xlsx** from today’s entry in the “Schedule” page of the course website and open the workbook.
2. You first want to chart the year-to-year trends for all majors, so select the range **A4:E11**.

Note: We don’t want to include column **F** because it contains average values which might complicate our understanding of the year-to-year trends. We also don’t include the totals in row **12** because doing so would greatly distort the scale of our chart when compared to the individual majors. We do include the titles and labels, however, because these will be useful in helping Excel construct a legend for our chart.

3. This should be a column chart, so click **Insert** > **Charts** > **Column** and select the *Clustered Column* chart subtype from the *2-D Column* section of the dropdown gallery. (This should be the first choice.)
4. Reposition the chart below the table so that its top-left corner appears in cell **A14**, and resize the chart by dragging the bottom-right resizing handle to cell **H29**. Notice that the labels listing the majors no longer appear at an angle.

Hint: Make sure that you see the ScreenTip that says “Chart Area” before you start dragging the chart; otherwise, you might accidentally drag a particular chart element instead, such as the legend or plot area. If you accidentally move a chart element instead of the chart itself, **Ctrl** + **Z** is your friend!

5. You also want to create a pie chart of the enrollment for the current Academic Year, AY2013. Select the nonadjacent ranges **A5:A11** and **E5:E11** together. (*Do you remember how?*)

Note: In general, one should take care that nonadjacent ranges are “parallel” so that the legend of your chart correctly reflects the data series you’ve selected. This means that each range should contain the same number of related cells. In particular, **A5:A11** and **E5:E11** are parallel ranges because **E5:E11** contains values that correspond directly to the labels in **A5:A11**.

6. Click **Insert** > **Charts** > **Pie** and select the *Pie* chart subtype from the *2-D Pie* section of the dropdown gallery. (This should be the first choice.)
7. Reposition the chart so that its top-left corner appears in cell **J14**.

8. On the **Chart Tools** > **Format** tab, resize the pie chart by changing the “Shape Height” to 3.25” and the “Shape Width” to 4.5”.
9. To bring attention to the number of undeclared students and set them apart from the rest of the pie, you decide to “explode” the *Undeclared* slice of the pie:
 - a. With the chart still selected, click any slice of the chart. (This selects all slices.)
 - b. Next, click the *Undeclared* slice to select just that slice.
 - c. Once only the *Undeclared* slice is selected, drag it away from the rest of the pie a little bit.
10. You just got a last-minute update from the Technology & Computing Department! Three students just declared computer science as their major! Change cell **E10** from 64 to 67, and change cell **E11** from 63 to 60. Notice how both of your charts automatically update to reflect this new information.
11. You feel as though your pie chart is looking a bit bland, and decide to apply a chart style to spice it up! In **Chart Tools** > **Design** > **Chart Styles**, select *Style 26*.
12. You want a title for the chart, as well as a layout where the department names appear on or near the slices themselves. In **Chart Tools** > **Design** > **Chart Layouts**, select *Layout 5*.
13. Click the “Chart Title” placeholder, type “AY2013 Enrollment”, then press **Enter**.
14. Type your name in cell **A31** and save all changes to your workbook.

Submission

To receive credit for these exercises, call over the instructor, who will check that you have completed the assignment. Then, log into CourseWeb and use the “Assignment Submission” section to submit your “salaries.xlsx” and “majors.xlsx” files for **Lab 4**.

You should be able to complete this lab in the allotted class time; however, if you are running low on time, the instructor will give you further instructions for completing the rest of this lab at home.

Your lab must be checked by the instructor BEFORE you leave the room AND you must submit your files to CourseWeb in order to receive credit for the lab! Don’t forget!