

## INTRODUCTION TO USING EXCEL

Manipulation and analysis of data is easy to do using computer software. The simplest software that is most likely available to you is Microsoft Excel (herein referred to as "Excel".) Excel is a spreadsheet application that is part of the Microsoft Office Suite. It enables the calculation and display of mathematical formulas (also called functions) with a facility for extensive formatting. Functions are predefined calculations that may be included in any given Excel cell to perform specific manipulation of data. Using Excel, data could be imported from a variety of sources.

This overview focuses on introducing the basic features of Excel to help you become more familiar with the software and to ultimately perform a few basic data analyses. This overview will provide basic information about:

- 1 the most important thing to learn - how to save your work!
- 2 workbooks, worksheets, rows and columns
- 3 absolute versus relative references to cell content
- 4 how to add (insert) or delete cells, rows, columns and new worksheets
- 5 calculations - adding, summing values in cells, built-in functions
- 6 how to create a line graph
- 7 saving your work and exiting Excel

### 1. The most important thing to learn - how to save your work!

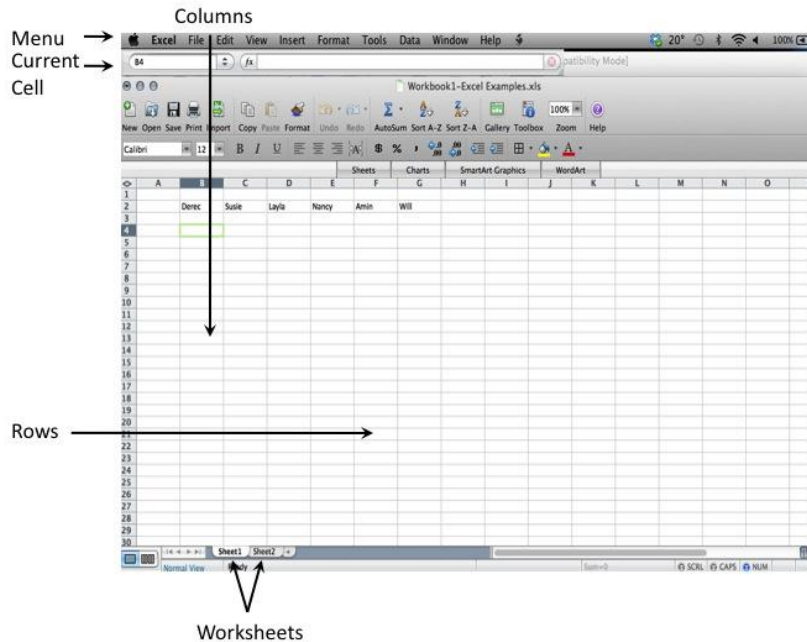
Don't become frustrated by working on your data in Excel, only to have the software "lock" up or quit unexpectedly - thus deleting all of your hard work!

*Save your work as frequently as often!*

This cannot be understated! To save your data, click on the "File" option from the top menu bar and select the "Save" option from the pull-down menu. Alternatively, on a Mac computer, you can press the Command plus "S" keys to save your work. On a Windows computer, you can press "Ctrl" plus "S" to save your work. **You should do this often during the course of your work in Excel (or in any other software package for that matter)!**

### 2. Workbooks, Worksheets, Rows and Columns

It is very beneficial for you to become familiar with the basic features of Excel workbooks and worksheets. Many people generally use the two terms "spreadsheet" and "worksheet" interchangeably. However, the term *worksheet* refers to the row-and-column matrix sheet on which you work upon (see figure below) while the term *spreadsheet* refers to this type of computer application.



In Excel, a **workbook** is the file in which you work and store your data. This file, or workbook, *can contain many worksheets*, so you can organize various kinds of related information in a single file.

Within a workbook, worksheets are used to list and analyze data. You can enter and edit data in several worksheets and perform calculations based on data from multiple worksheets. When you create a chart, you can create and graphs in the worksheet either with its related data or on a separate chart sheet. The names of the worksheets appear on tabs at the bottom of the workbook window. To move from one sheet to another, click the sheet tabs.

Worksheets are made up of columns and rows. In a worksheet the "cell" is defined as the space where a specified row and column intersect. Each cell is assigned a name according to its "column" letter and "row" number. In each cell there may be the following types of data: text, numbers (also called constants), and formulas (mathematical equations that do work).

To change the width of any column, position the pointer between the column headings for two columns (the pointer should change shape to show a double-headed arrow as you position the pointer between the two column headings). When the pointer changes shape, you can change the width of the column by pressing the left mouse button and dragging to the right or left. Press the left mouse button and drag to the right until the width of the column fits the text.

### 3. Absolute versus relative references to cell content

Selecting cells is a very important concept of a spreadsheet. We need to know how to reference the various parts of the spreadsheet. Depending on the task you want to perform in Excel, you can use either **relative cell references** (which are references to cells relative to the position of the formula) **or absolute cell references** (which are cell references that always refer to cells in a specific location).

If a dollar sign precedes the letter and/or number, such as \$A\$1, the column and/or row reference is absolute this reference to a specific cell *will never change - this is an absolute reference*. Relative references automatically adjust when you copy the cells and move the cell contents to some other part of the worksheet - the *content of these cells can change - it is relative to what is in other cells*.

#### **4. How to add (insert) or delete cells, rows, columns and new worksheets**

To insert a new worksheet, follow the following steps: Start Excel. The application starts with several worksheets (usually 3). To insert a new worksheet, from the top menu items, select "Insert", then click on "Worksheet". To rename a worksheet, at the bottom of the worksheet, right-click on the tab and select "Rename" from the shortcut menu (alternatively, you could double-click the tab to accomplish the same). Type in the new name.

To insert a new column, click from the top menu items, select "Insert", then click on "Column." A new column is inserted to the left of the column your cursor is currently at. Alternatively, you can click on the top cell in a column to "select" that column, right click again to get a shortcut menu, choose "Insert" from this menu and a new column is inserted to the left of that highlighted column. You can also right click on any individual cell, choose "Insert" on the shortcut menu and click the appropriate option to insert a column to the left of the current cell. To delete a column, highlight the column by clicking on the column letter, right click, then choose "Delete." You can also right click on any cell, choose "Delete" from the shortcut menu, click on the appropriate option to delete the column that the cursor is currently located in.

To insert a new row, highlight a row by clicking on the row number, right click to get a shortcut menu, choose "Insert" from this menu and a new row is inserted above the highlighted row. Alternatively, click on the top menu item that says "Insert", then click on "Row". A new row is inserted above the row that your cursor is resting on. To delete a row, highlight the row by clicking on the row's number, right click, then choose delete.

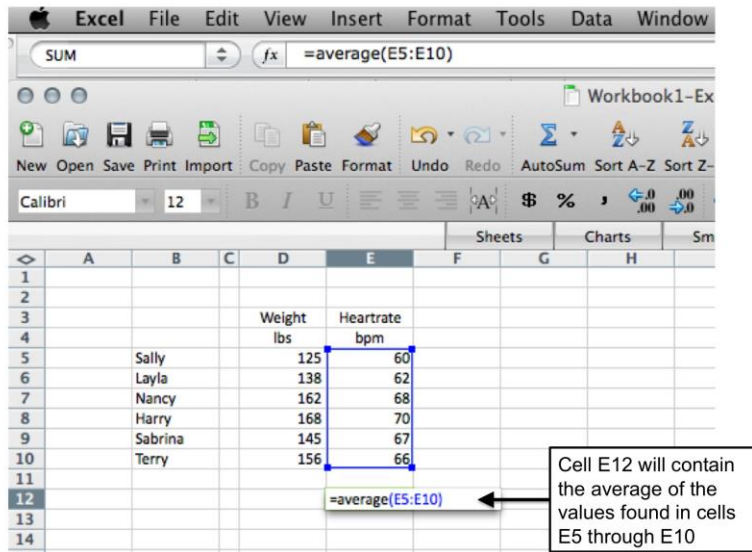
To insert a cell, put your cursor to the left or to the top of where you would like to insert your cell. Right click on that cell and pick "Insert" from the shortcut menu. You then choose the appropriate option to insert a cell to the right or below where the current cell is located. To delete a cell, right click on that cell, pick "Delete" from the shortcut menu and choose the appropriate option of how the surrounding cells should move due to the deletion of that cell.

#### **5. Calculations - Adding, Summing values in cells, Built-in Functions**

Spreadsheets have many mathematical functions built into them. The most basic operations are the multiplication (\*), division (/), addition (+), and subtraction (-). There is an order of operations when you are evaluating a formula. Formulas are evaluated from left to right. Expressions enclosed in parentheses are evaluated first followed by exponents, multiplication and division, and then addition and subtraction.

Excel has many more operators and mathematical operations that can be performed using "functions" that perform many basic mathematic or summary statistics - for example, "sum" will automatically sum values from selected multiple cells and "average" will automatically average numbers in the selected multiple cells (see figure below).

All formulas in Excel must begin with an equal sign (=). When a formula is entered into a cell, the formula itself is displayed in the "Formula Bar" when that cell is highlighted, and the result of the formula is displayed in the actual cell.



## 6. How to create a line chart or a x-y scatter chart

A line chart provides a nice visual way to map two numerical variables. The line segment that connects the points on the graph expresses the trend of the data, but does not give a statistical equation to describe the relationship of the two variables. A line chart distributes data points evenly along the horizontal category axis (x-axis).

Scatter charts are similar to line charts but can show more than a general trend. The individual points that appear on the chart can be interpreted to express a trend, or, that there is a lack of a trend. However, additionally, a statistical equation can be produced via use of the software to describe the relationship between the two variables and a line can be produced to show this relationship.

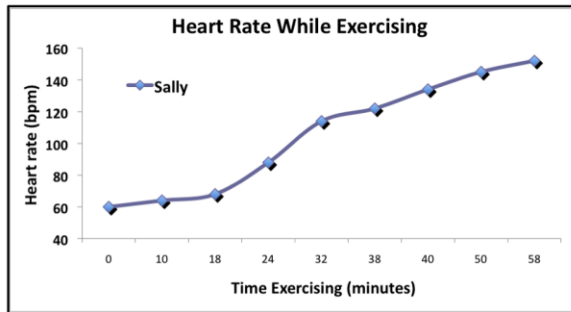
Consider the following data showing heart rate for two subjects (Harry and Sally), measured at various times after the start of an exercise routine. Note that a few of the times recorded (minutes after starting the exercise) are slightly different for Harry versus Sally.

	Exercise Time	Heartrate		Exercise Time	Heartrate
	minutes	bpm		minutes	bpm
<b>Sally</b>	0	60	<b>Harry</b>	0	64
	10	64		10	68
	18	68		20	76
	24	88		24	90
	32	114		36	132
	38	122		40	152
	40	134		44	158
	50	145		50	160
	58	152		60	168

These data will be represented differently on a line chart (data points are assumed by Excel to have even spacing) than a scatter chart.

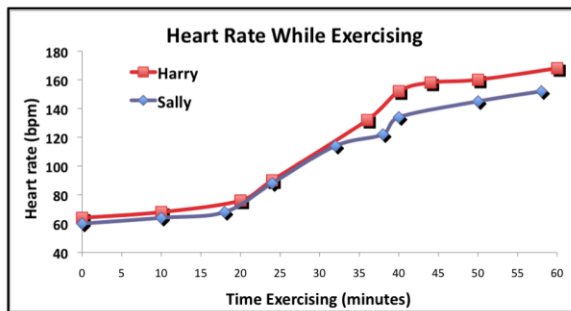
**Line Chart**

For line charts, Excel automatically assumes equal spacing between data points.



**XY Scatter Chart**

Scatter charts will show correct relationships between data points that do not have equal spacing between the data values.



**HOW TO CREATE A LINE CHART:**

A) Arrange the data in columns. For this exercise, type the following data into a worksheet:

	Exercise Time	Heart rate
	minutes	bpm
<b>Sally</b>	0	60
	10	64
	18	68
	24	88
	32	114
	38	122
	40	134
	50	145
	58	152

Note that the data in the column labeled "Exercise Time - minutes" are in descending order. These data will be graphed as the x-axis. Data to be graphed in a line chart in Excel must be sorted in descending or ascending order.

B. Select the data in the rows or columns to include in the line chart. To do this, click on the first cell you want included in your line chart and while holding down the mouse button, drag your mouse to highlight the rest of the data you want on your chart.

C. From the top menu bar, click on "Insert" and select "Line" from the "Chart" options. Choose and click on the chart subtype you want from the pictures.

D. You can move the chart to any location in your worksheet by clicking on it and dragging it when you see the four-way arrow.

E. Adjust the size of the chart by moving each side, and the top and bottom in or out with your mouse. You can right click on the chart to obtain chart formatting options.

### **HOW TO CREATE A SCATTER CHART:**

A. Steps "A" and "B" are identical to above section on how to create a line chart. For step "C", click on "Insert" and select "Scatter" from the "Chart" options. Choose and click on the chart subtype you want from the pictures. Steps "D" and "E" from above section are the same.

## **7. Saving your work**

Before you end your Excel session, you should save your workbook if you intend to continue working on it in the future or want to save a copy for future reference. To do so, click on the "File" option from the top menu bar and select the "Save" option from the pull-down menu. The next time you want to work on this workbook (or any other workbook), choose the "File" option from the top menu bar and select the "Open..." option from the pull-down menu. To end your Excel session, choose the "Exit" option from the same pull-down menu.