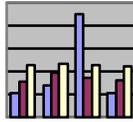


Using Excel to Graph a Non-Linear Equations



Level: OBS

Goal: To become familiar with Microsoft Excel and the Chart Wizard in order to create graphs of non-linear equations on the computer.

Learning Outcomes:

- ◆ Use a spreadsheet to construct a table of values
- ◆ Use the Chart Wizard to create graphs of linear equations

Contents

- ❖ **Getting Started**
 - Starting Microsoft Excel
- ❖ **Introduction to Spreadsheets**
 - What is a Spreadsheet?
 - What can a Spreadsheet Do?
 - Moving Around the Spreadsheet
- ❖ **Constructing a Table of Values**
 - Entering Data onto a Spreadsheet
 - Entering Formulas onto a Spreadsheet
 - Using the Copy and Paste Options
- ❖ **Using Chart Wizard**
 - Selecting Data on the Spreadsheet
 - Selecting Chart Types
 - Selecting Data Ranges
 - Formatting Chart Options
 - Selecting Chart Location
- ❖ **Saving the Spreadsheet**
 - Saving for the First Time
 - Saving Changes
- ❖ **Demonstrations (exercises to be handed in)**

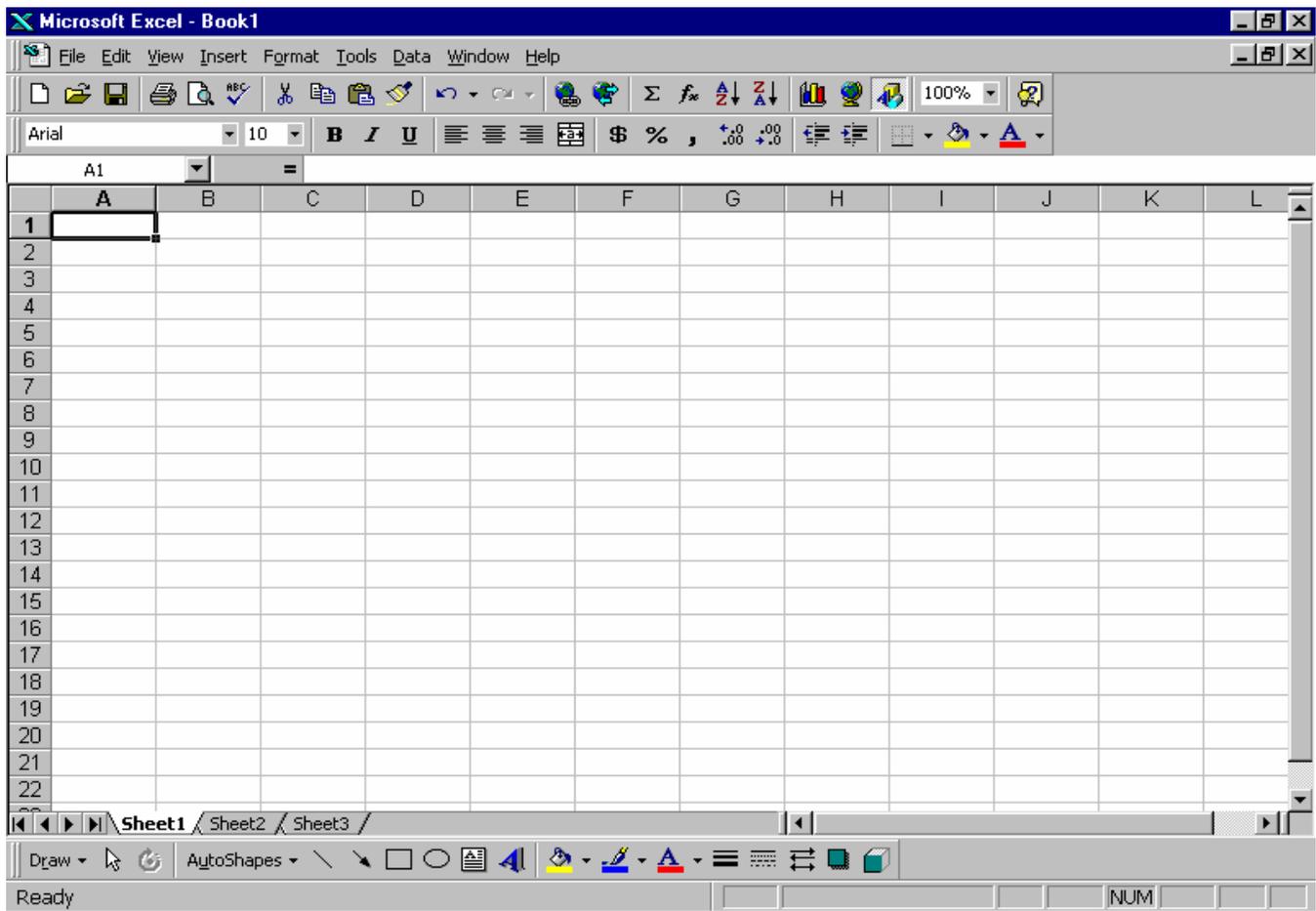
Prerequisite:

- ✓ Basic understanding of Computers
- ✓ Completed College Preparation Math (CPM) – chapter 9 (Quadratic Equations)

Getting Started

Starting Microsoft Excel

Microsoft Excel is a member of the Microsoft Office Group. Using the left mouse button, click on the **Start** button and move the pointer up to Programs (it should be highlighted). A new menu will appear. Next, move the cursor across to the new menu and position the pointer over Microsoft Office. Yet another menu will appear. Again, move the pointer over to the new menu and find Microsoft Excel. With the mouse pointer positioned over the words "Microsoft Excel", click the left mouse button and Excel will open. The screen should look similar to the one below.



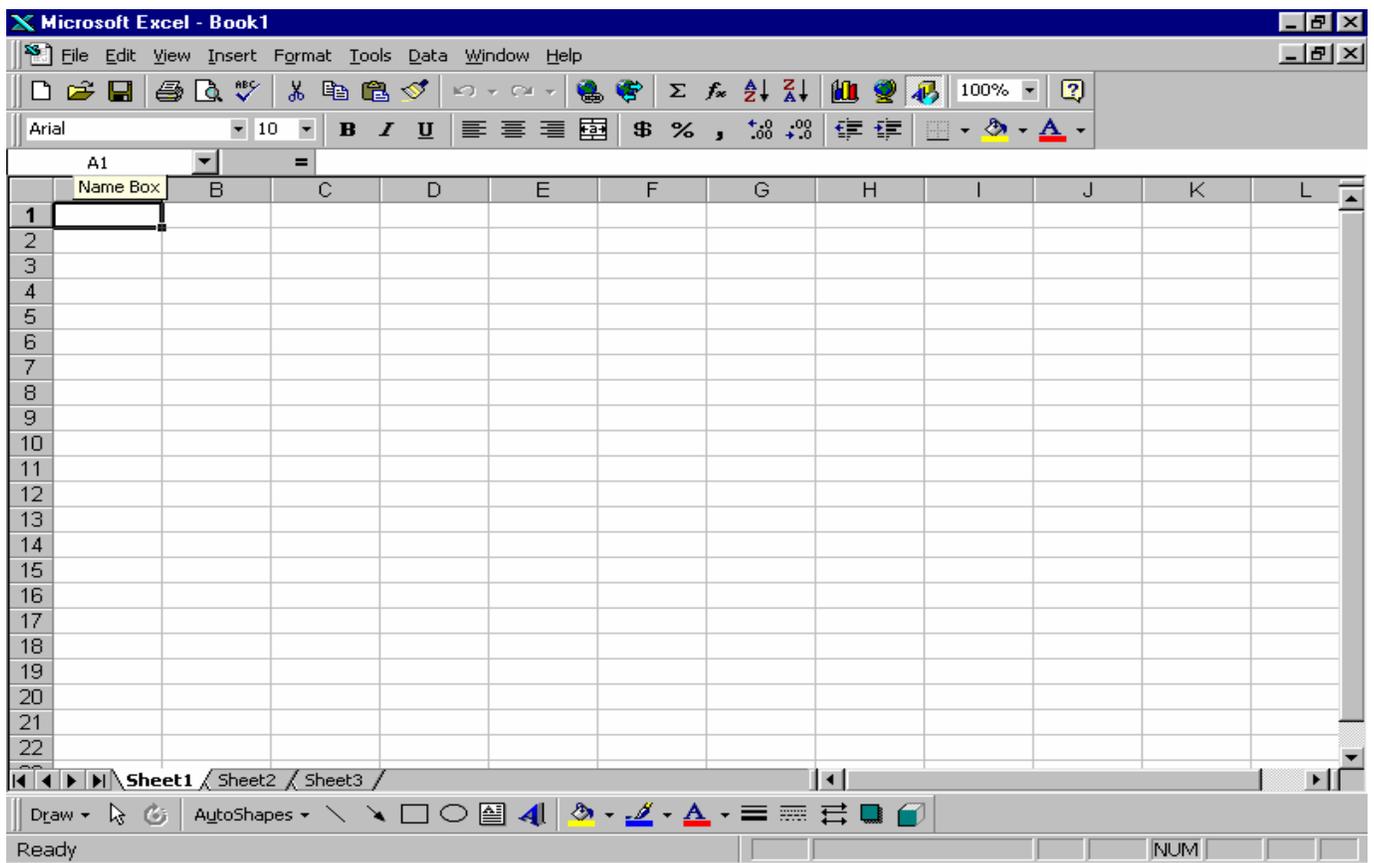
This module will introduce you to Microsoft Excel and walk through the step by step process of creating non-linear graphs using the Chart Wizard.

Introduction to Spreadsheets

What is a Spreadsheet?

A spreadsheet is made up of a group of cells. It is set up as a grid with columns and rows. Each cell in the grid has an address. The highlighted cell on the previous page (the one with the box around it) is the **ACTIVE CELL**. This cell's address is **A1** since it is in *column A* and *row 1*. **All cells** have an address depending on which column as well as which row they are in. The address of the **ACTIVE CELL** is displayed in the **Name Box** in the upper left corner of the screen just above the row and column headers.

Note: **ACTIVE CELL** simply refers to the cell that is waiting to have information entered into it.



What Can a Spreadsheet Do?

Different types of information can be entered into the cells of a spreadsheet including **text**, **numbers** and **formulas**. Excel can **perform calculations**, **create graphs** and many other things using the information from the cells.

The easiest way to create a graph of a non-linear equation is to use the Chart Wizard. Before using the Chart Wizard, a table of values is needed. To construct a table of values, we need to be able to move around the spreadsheet.

Moving Around the Spreadsheet

Moving around the spreadsheet can be done using the arrow keys on the keyboard. The right arrow key moves the *active* cell **right**, the left arrow key (\leftarrow) will move the *active* cell **left**, the down arrow key (\downarrow) will move the *active* cell **down**, and the up arrow key (\uparrow) moves the *active* cell **up**.

Note: There are other ways of moving around the spreadsheet:

- 1) Use the mouse pointer (it looks like an oversized plus sign). Just position the pointer over the cell you wish to make active and left click.
- 2) The “Tab” key on the left side of the keyboard can be used to move the active cell once to the right.
- 3) The “Enter” key (some keyboards label it “Return”) moves the active cell down one cell when pressed.

Constructing a Table of Values Using Microsoft Excel

As noted previously, a table of values is required in order to create a graph. A table of values requires a header for each column.

Entering Data onto a Spreadsheet

In cell address **A1**, enter x (this is header for the x values)

In cell address **B1**, enter $y = x^2 - 3$. (see Note below)

For the equation $y = x^2 - 3$, values of x are selected (by you), and the corresponding value of y is calculated.

Note: Shift + 6 on the keyboard (looks like the top of an arrow \wedge) is used to indicate an exponent in Microsoft Excel. **You will type $y=x^2-3$**

In cell Address **A2** enter the number -2 .

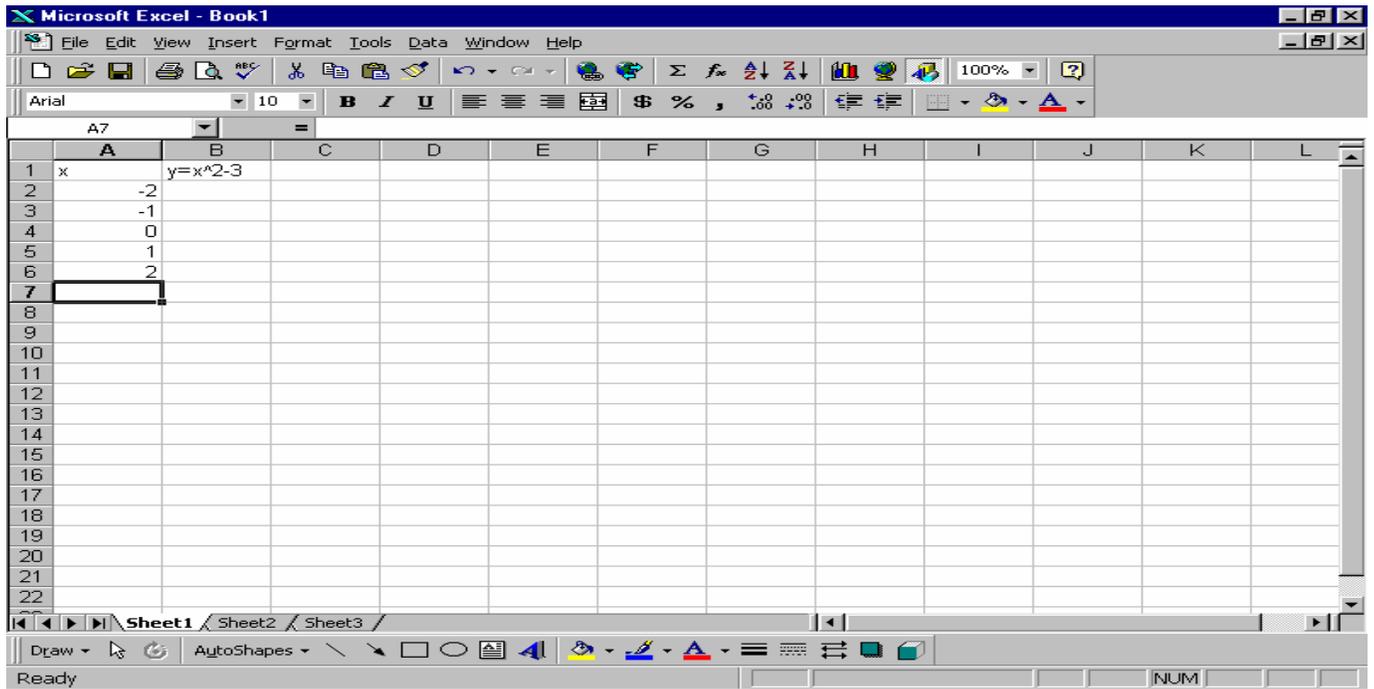
In **A3**, enter the number -1 .

In **A4**, enter the number 0 .

In **A5**, enter the number 1 .

In **A6**, enter the number 2 .

Your screen should look similar to the one on the next page.



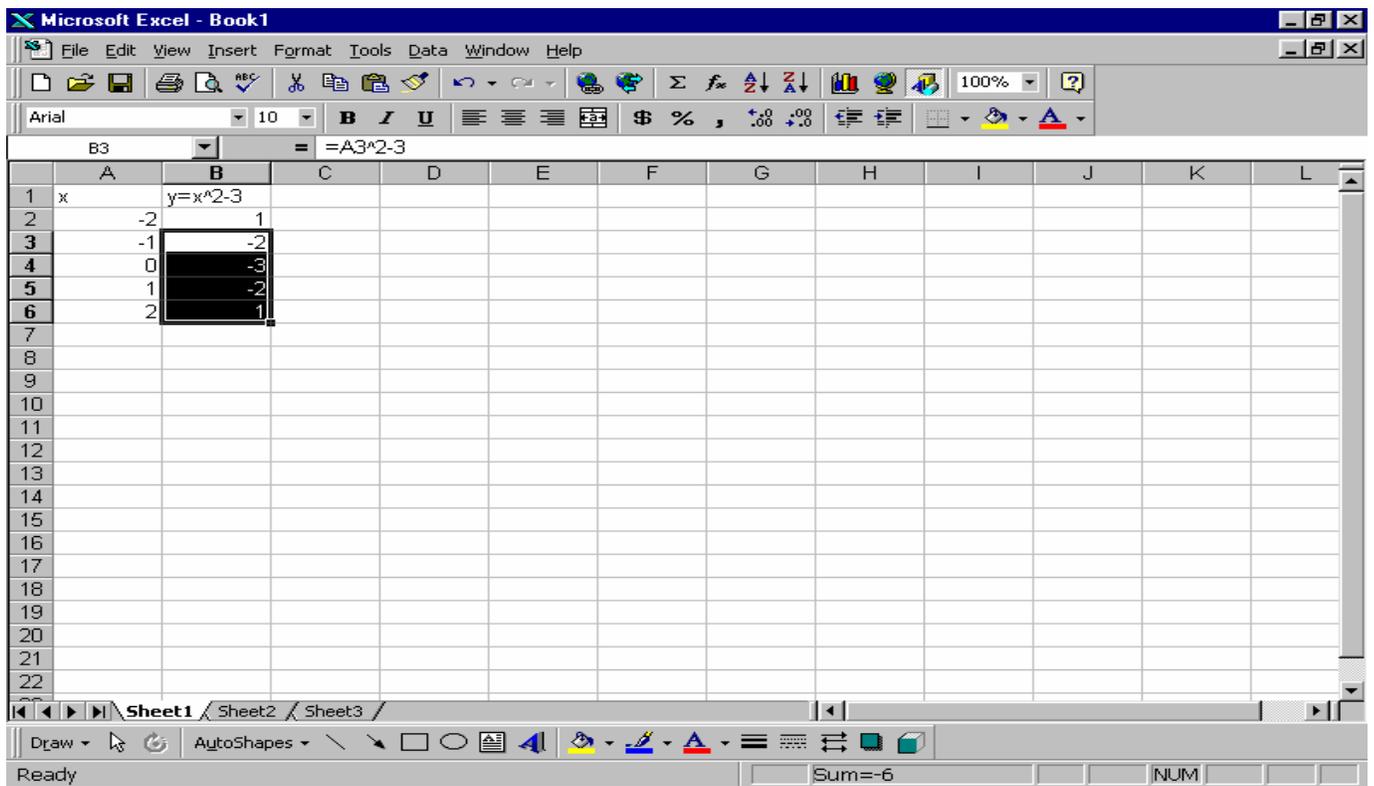
Entering Formulas onto a Spreadsheet

For each value of x , a formula can be entered to calculate the y value.

In cell **B2** type $=a2^2-3$. This formula states the value of cell **B2** is equal to cell **A2** squared minus 3. When the enter key is pushed, the number 1 is displayed in cell **B2**. This is the value of y when x is -2 ; therefore, $(-2,1)$ is a point on the graph.

Using the Copy and Paste Options

To get the rest of the y values, we simply copy the formula from **B2** and paste it into cells **B3**, **B4**, **B5**, **B6** & **B7**. With cell **B2** as the active cell, left click on the Edit menu located on the toolbar and select Copy from the list of options. Cell **B2** will have a broken line that appears to be moving around the outside of the cell. Position the pointer over cell **B3**, left click the mouse, and while holding the left mouse button down, move the pointer down to cell **B6**. The cells **B3** to **B6** should be highlighted (black). Left click on the Edit menu again and select Paste from the list of options. The formula will automatically calculate each y value for the x value beside it. Your screen should look similar to the one on the next page.



Using Chart Wizard

Selecting Data on the Spreadsheet

Chart Wizard is a four-step process for creating graphs. Prior to using Chart Wizard, we need to select the data (table of values) we wish to graph. This tells Chart wizard what to graph. Using the mouse, left click in cell **A1**. While holding the left mouse button down, move the mouse to cell **B6**. The cells will turn black as you pass over them. While the pointer is over cell **B6**, release the mouse button. Your screen should look similar to the one below.

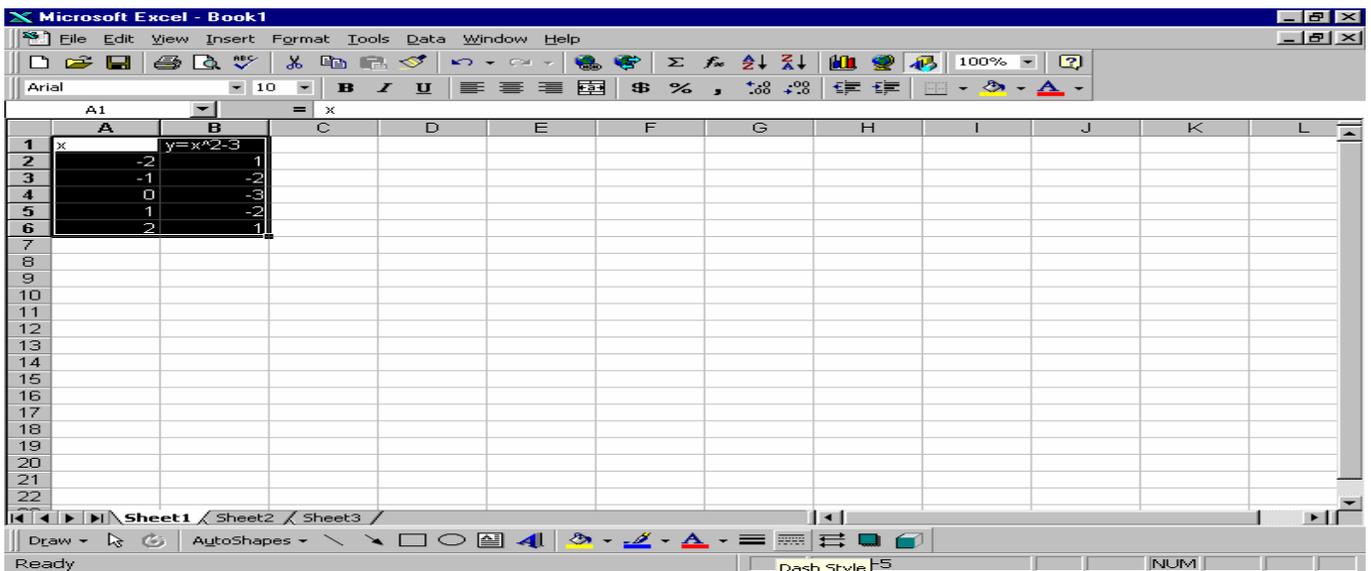
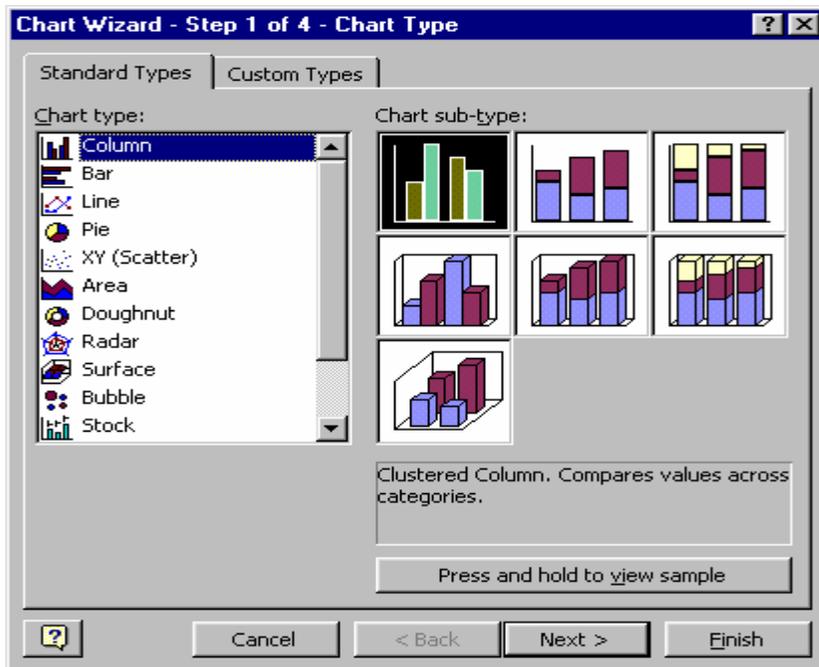
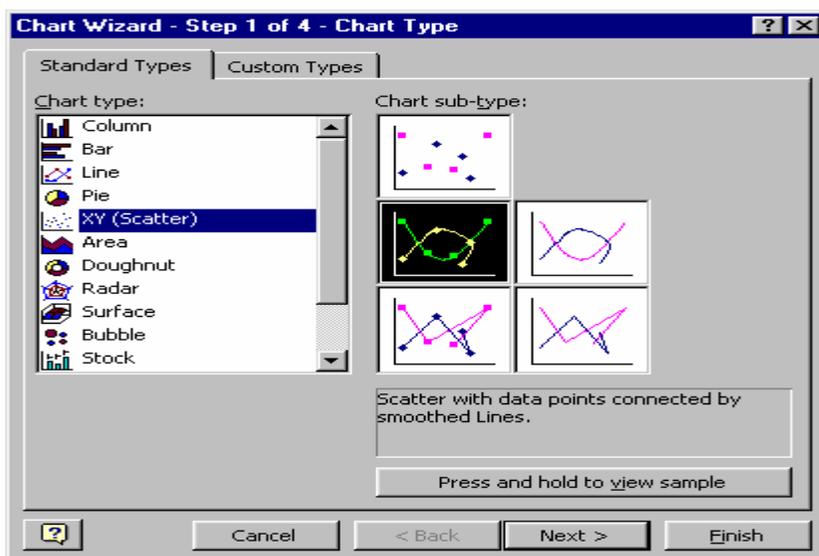


Chart Wizard is located in the Inset menu on the toolbar. Left click on the Inset menu and select the Chart option. A dialogue box similar to the one below should appear on the screen.



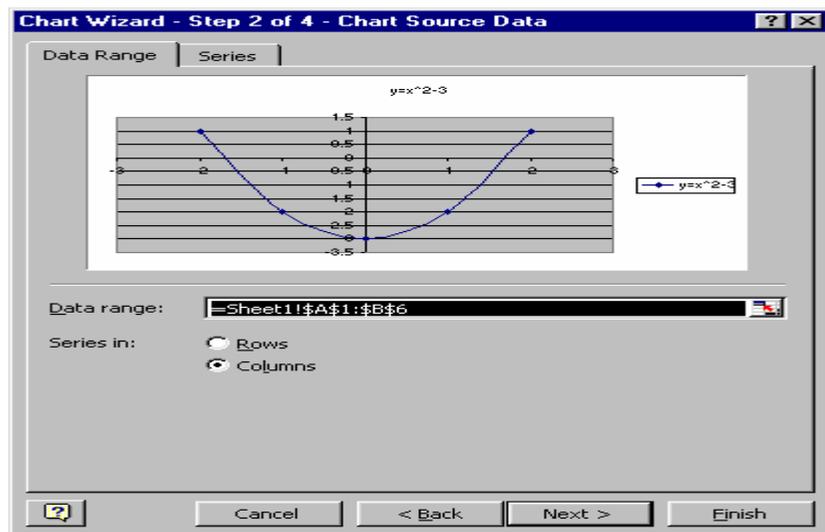
Selecting Chart Types

Step 1. As it says in the title bar, Chart Wizard is a four-step process and step one involves choosing the chart type. Choose **XY (Scatter)** and for the chart sub-type, choose the middle one on the left. The Chart Wizard box should look similar to the one below. Click the Next > button.



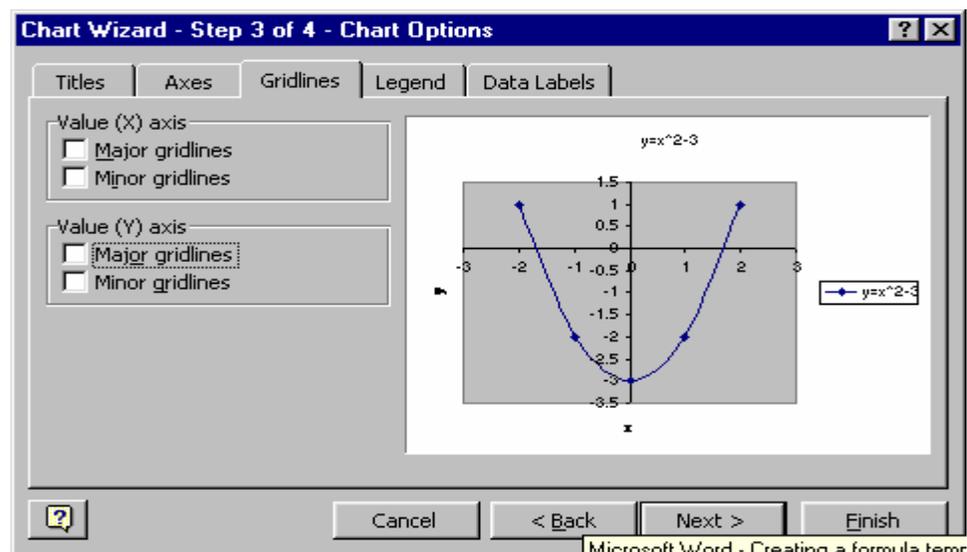
Selecting Data Ranges

Step 2 involves selecting the data for the chart. Since our data was highlighted prior to starting Chart Wizard, the data is already selected (the Data range box is filled in). Note that a picture of what the graph looks like is shown in the 2nd step. We simply click Next > to proceed to step 3 of 4



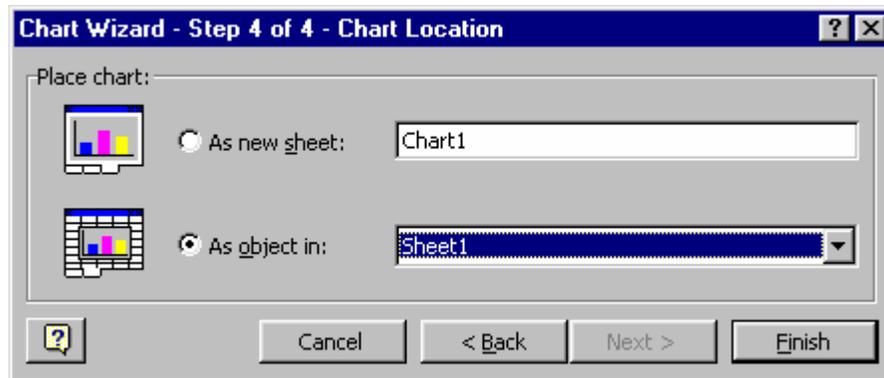
Formatting Chart Options

Step 3 allows us to add titles, labels and generally “dress” the chart up. The Chart Title box is already filled in with $y = x^2 - 3$. To keep things simple, left click in the Value (X) Axis box and type x . Do the same thing for the Value (Y) axis typing y in that box. We don't require Gridlines (besides the x and y -axis) so left click on the Gridlines tab and uncheck all boxes with check marks in them. Simply left click inside the box with a check mark, and it will disappear. It should look similar to the one below. Click on the Next > button to proceed to the final step.

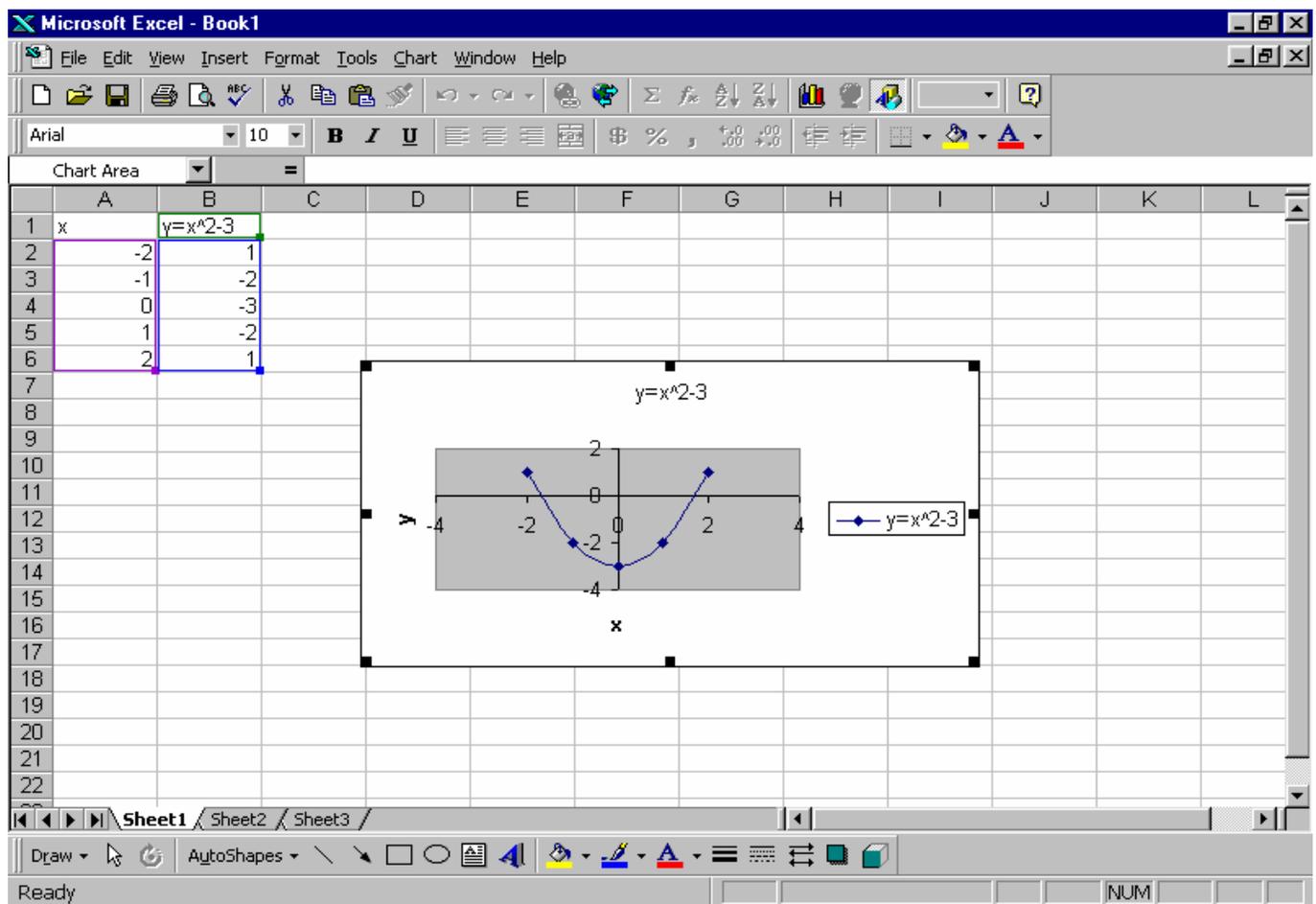


Selecting Chart Location

Step 4 asks where the sheet should appear. The default is “As object in:”. We will use the default setting.



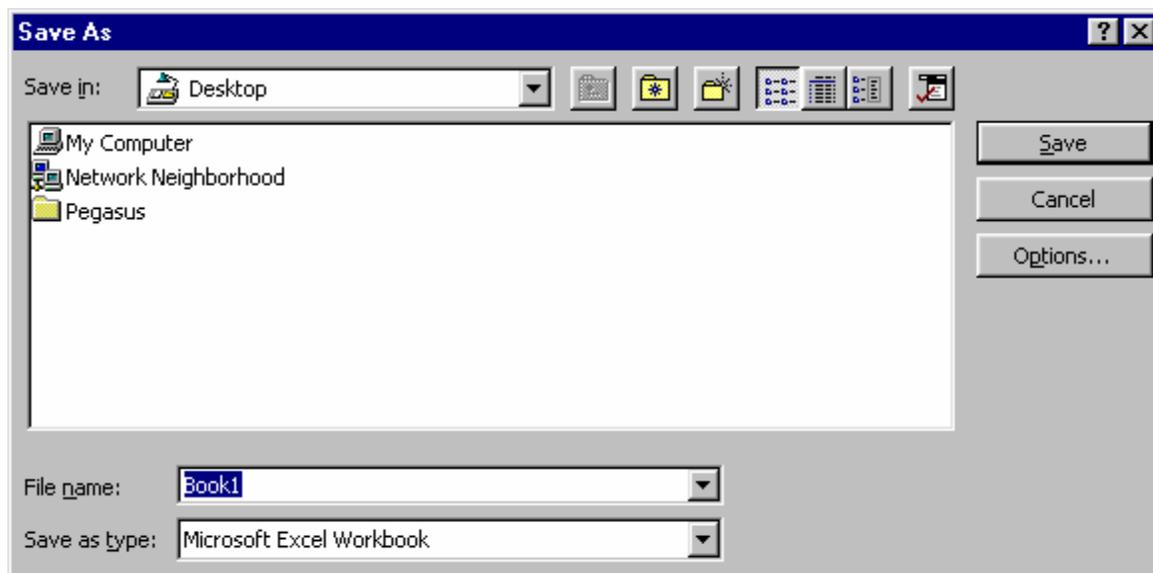
By left clicking on the Finish button, our newly created chart will appear on the page with the table of values. Your screen should look similar to the one below



Saving the Spreadsheet

Saving for the First Time

Now is a good time to save what we've done so far. Position the mouse pointer over the word File located in the upper left part of the screen. Left click and a menu will drop down (called a drop-down menu). Move the pointer over the word Save, and left click again. A box will appear similar to the one below.



Type NonLinear Graph1 and click on the Save button. Your work is now safe should there be a power failure or the computer “crashes” for some unknown reason.

Saving Changes

If you wish to make changes to the file we just saved, you will need to save those changes after they are made. Each time you Save a file after the first time, the file is updated to what is currently on the screen. It is important to save regularly to avoid losing information that you have worked hard on. Each time you save changes, you are replacing the file with the most current version you have.

Check with your instructor if you have any questions or concerns about this module before proceeding the demonstrations on the next page.

Demonstration # 1

Using Microsoft Excel's Chart Wizard and a table of values, create an (XY) Scatter graph for the following equation:

$$y = -2x^2 + 7 \quad \text{Use a table of values with } x \text{ values between } -10 \text{ and } +10 \text{ in increments of } 1.$$

Demonstration #2

Using Microsoft Excel's Chart Wizard and a table of values, create an (XY) Scatter graph for the following equation:

$$2x^2 - 5y - 55 = 0 \quad \text{Use a table of values with } x \text{ values between } -10 \text{ and } +10 \text{ in increments of } 1.$$

(hint: re-arrange the equation to solve for y)