Microsoft Excel for Grading
Microsoft Excel for Grading

The software described is Microsoft Excel 2003 running on Windows XP.

Prerequisites

You should have a working knowledge of Microsoft Excel, including how to enter data, work with cells and ranges, and navigate a worksheet. You should also be familiar with the Windows XP desktop and with general concepts of manipulating windows such as menus, scrollbars and dialog boxes.

Key:

- Caution
- Cool Tip
- Please Note
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Activities
Lesson 1

Review of Microsoft Excel Basics
The Excel Workbook

• A workbook is a set of worksheets.
• You can switch between worksheets using the tabs at the bottom of the window.
• A workbook may contain 1 to 255 worksheets.

Worksheet

A worksheet is a grid made up of:

• **Columns**—the vertical space, designated by letters running across the top of the worksheet.
• **Rows**—the horizontal space, designated by numbers running down the left of the worksheet.
• **Cells**—the intersection of a column and a row.

Cell

• Every cell may contain text, a number, or a formula.
• Every cell is uniquely identified by a letter + number combination based on its column and row.
• The **active cell** has a thick, dark border and its name displays on the cell name bar.
Using Multiple Worksheets

Multiple sheets are useful if you need to calculate grades from a large number of assignments. You can organize grading criteria by type. For example, homework assignments could be managed on one worksheet and quizzes on another. You can maintain your full class roster on one worksheet and reference it from the others. This insures that your data is consistent without having to type student names over and over.

Inserting New Worksheets

1. Go to Insert>Worksheet on the Menu bar.
2. A new worksheet will be inserted before (to the left) of the current active worksheet.

Moving Worksheets

Click and drag the worksheet’s tab at the bottom of the page to the desired location. Your cursor will have an icon that looks like a page and a small black triangle will indicate possible new locations.

Renaming Sheets

1. Double click on the worksheet’s tab.
2. The worksheet name will become highlighted and your cursor will change to allow you to insert text.
3. To accept the change you made, press [Enter] or click off the tab.

Navigating Excel

• Use your scroll bars and mouse to click directly into a cell.
• Select “Go To” from the Edit menu and type a cell address.
• Use the tabs at the bottom of the screen to switch between worksheets.
• Use your keyboard as described in the table below:

<table>
<thead>
<tr>
<th>Press Key(s):</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrow</td>
<td>Move to the next cell (down↓, up↑, left ←, right→).</td>
</tr>
<tr>
<td>Tab</td>
<td>Move a cell to the right.</td>
</tr>
<tr>
<td>Enter</td>
<td>Move to the next row.</td>
</tr>
<tr>
<td>Page Up</td>
<td>Move a full screen up.</td>
</tr>
<tr>
<td>Page Down</td>
<td>Move a full screen down.</td>
</tr>
<tr>
<td>Alt + Page Up</td>
<td>Move a full screen to the left.</td>
</tr>
<tr>
<td>Alt + Page Down</td>
<td>Move a full screen to the right.</td>
</tr>
<tr>
<td>Home</td>
<td>Move to the first cell of the active row.</td>
</tr>
<tr>
<td>Alt + Home</td>
<td>Move to the first cell of the active worksheet (A1).</td>
</tr>
</tbody>
</table>
**Entering and Accepting Data**

To enter information:

1. Navigate to the cell where you want data to appear and type.
2. Do one of the following:
   - Press the [Enter] key to accept the data and move you a row down.
   - Press the [Tab] key to accept the data and move one cell to the right.
   - Click the green checkmark on the Formula bar to accept the data while keeping your cursor in the same cell.

**Editing Data**

To change data before it has been accepted:

1. Use [Backspace] to delete and retype the entry.
2. Pressing [Esc] to clear the entire entry.

To change data after it has been accepted:
If you've already entered the data in the cell, you can still change it by using one of the following choices:

1. Double-click the cell or click into the cell and press F2 to return to “edit” mode.
2. Click into the cell and begin to type. This will overwrite the existing contents.
3. Click into the cell and edit the data in the Formula bar.

**Selecting Data**

To select:

An **entire row**: click on the Row Heading (the number at the left of the row).

An **entire column**: click on the Column Heading (the letter at the top of the column).

An **entire worksheet**: click in the box to left of Column Heading A and above Row Heading 1.

A range of adjacent cells (A range is a group of two or more cells):

**“Press, drag, release” method**
Click into a cell, hold the mouse button down, and drag to make your selection and then release the mouse button.

**“First, [Shift], last” method**
Click into the cell and hold down the [Shift] key and click on the last cell to select all cells in between.

You may select a range of entire rows or columns by using the headings and the techniques described above.
To select:

Non-adjacent cells or ranges:
1. Highlight the first cell or a range of cells.
2. Press and hold the [Control] key and select additional cells or ranges. 
   *On a Macintosh: use the [Command] key.*

Excel’s Text to Speech feature allows you to audibly verify your data.
1. From the View menu, select: Toolbars and then select: Text to Speech. 
   The Text to Speech Toolbar will display.
2. Select the range of cells you want to verify.
3. Click **Speak Cells** to have Excel read back each cell in your selection.
4. Turn off this feature with the **Stop Speaking** button.

Moving Data

“Drag-and-Drop” method
1. Select the data you want to move.
2. Move the mouse pointer over the border of the selection. The mouse pointer changes to a 
   four-headed arrow.
3. Press and hold the mouse button and drag the selection to its new location. As you move, 
   an outline follows showing the shape of the selection.
4. When it covers the area you want to fill, release the mouse button.

“Cut (or Copy) and Paste” method
1. Select the data to be cut (or copied).
2. Cut.
3. Click into the cell where you want to paste the data. 
   *If you are pasting a range of cells, click into the cell that you want to become the upper-left hand corner.*
4. Paste.

Choices for Cut, Paste and Copy:

<table>
<thead>
<tr>
<th></th>
<th>Edit Menu</th>
<th>Keyboard Shortcut</th>
<th>Toolbar Icon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut</td>
<td>Select: Cut</td>
<td>[Ctrl] X</td>
<td>![Cut Icon]</td>
</tr>
<tr>
<td>Paste</td>
<td>Select: Paste</td>
<td>[Ctrl] V</td>
<td>![Paste Icon]</td>
</tr>
<tr>
<td>Copy</td>
<td>Select: Copy</td>
<td>[Ctrl] C</td>
<td>![Copy Icon]</td>
</tr>
</tbody>
</table>
**Insert Copied Cells**

To paste data between cells that already contain data use **Insert>Copied Cells** from the **Menu bar**.

1. Select and copy (or cut) the cells you want inserted between existing cells.
2. From the **Insert** menu, select **Copied Cells**.
3. Select a direction to move the cells to allow the insertion.

**Formatting Data**

Excel’s default, **general**, format aligns text to the left and numbers to the right. You may use the formatting toolbar and the **Format Menu** to change formatting.

**Formatting Tips**

- The **Format** menu allows you to set the number of decimal places for numbers. Select: **Format>Cells>Number Tab>Number**
- To prevent Excel from dropping an initial 0 in zip codes or social security numbers, select: **Format>Cells>Number Tab>Special**

**Clearing Data**

1. Highlight the cell, range of cells, column, or row you want to clear.
2. Select **Edit > Clear** from the **Menu bar**.
3. Select the appropriate option:

   - **All**  
     Clears all data and any comments and reverts the format to the general default format.
   - **Formats**  
     Reverts the format to the general but leaves the data untouched.
   - **Contents**  
     Clears the data and any formula from the selected cells but leaves formatting and any notes intact.
   - **Comments**  
     Clears any notes but leaves the formatting and the data intact.

**Inserting Columns, Rows, Cells, and Worksheets**

**Columns**

Inserting a Column creates a blank column and moves all columns one column to the right, including the highlighted column. **Select several contiguous columns to insert that same number of columns**.

1. Click on the Column Header to the right of the location where you wish to insert a new column.
2. Select **Insert > Columns** from the **Menu bar**.

**Rows**

Inserting a Row creates a blank row and moves all rows down one row, including the highlighted row. **Select several contiguous rows to insert that same number of rows**.

1. Click on the Row Header below the location where you wish to insert a new row.
2. Select **Insert > Rows** from the **Menu Bar**.
Cells

1. Select Insert > Cells from the Menu Bar.
2. Specify which way you want the cells to shift.

Worksheets

1. Select Insert > Worksheet from the Menu Bar.

Deleting Columns, Rows and Cells

1. Click on the Column or Row Header, or cell or range of cells, you wish to delete.
2. Select Edit > Delete from the Menu Bar.
   
   • Columns shift left.
   • Rows shift up.
   • Cells you can specify which way you would like them to shift.

Resizing Columns and Row

There are three ways to adjust the width of a column or height of the row:

1. Drag the Double-Arrow
   Position the pointer on the Column Header (or row) division line. The mouse pointer will change to a double-arrow indicating that you can now resize the column/row. Drag left/right to resize the column or up/down to resize the row. Release the mouse when the column is at the width you want.

2. Select Format > Column (or Row) > Width (Height) and specify a width.

3. Format > Column (or Row) > AutoFit Selection.

⚠️ A shortcut to AutoFit a column or row is to double-click on the dividing line.
Lesson 2
Microsoft Excel
Formula and Function Basics
Overview of an Excel Formula

A formula is a set of instructions that you enter in a cell to perform calculations on values entered into other cells.

- Formulas are entered in the cell where you want the result to appear.
- Once the formula has been entered, the result displays in the current cell.
- The formula displays and can be edited in the Formula Bar.

All formulas include three key elements:

1. An equal sign (=) to begin the formula.
2. The cell references or values you wish to include in the calculation.
3. The mathematical operator(s) to be used in the calculation.

Values

- A constant value (120)
- A cell (B2)
- A range of cells (B2:B10)
- A label or a name (FirstQuarterSales)
- A worksheet function (SUM)
Mathematical operators:

<table>
<thead>
<tr>
<th>Operator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Plus sign for addition.</td>
</tr>
<tr>
<td>-</td>
<td>Minus sign for subtraction.</td>
</tr>
<tr>
<td>*</td>
<td>Asterisk for multiplication.</td>
</tr>
<tr>
<td>/</td>
<td>Front slash for division.</td>
</tr>
<tr>
<td>^</td>
<td>Caret symbol for exponents.</td>
</tr>
<tr>
<td>( )</td>
<td>Open and close parentheses to group computation instructions.</td>
</tr>
</tbody>
</table>

Order of Operations

Excel calculates a formula from left to right. When more than one mathematical operator appears in a formula, Excel calculates according to the standard mathematical order of operations (parentheses, exponents, multiplication and division, addition and subtraction).

Referencing Cells and Ranges

<table>
<thead>
<tr>
<th>To refer to:</th>
<th>Use:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The cell in column A and row 10</td>
<td>A10</td>
</tr>
<tr>
<td>The range of cells in column A and rows 10 through 20</td>
<td>A10:A20</td>
</tr>
<tr>
<td>The range of cells in row 15 and columns B through E</td>
<td>B15:E15</td>
</tr>
<tr>
<td>All cells in row 5</td>
<td>5:5</td>
</tr>
<tr>
<td>All cells in rows 5 through 10</td>
<td>5:10</td>
</tr>
<tr>
<td>All cells in column H</td>
<td>H:H</td>
</tr>
<tr>
<td>All cells in columns H through J</td>
<td>H:J</td>
</tr>
<tr>
<td>The range of cells in columns A through E and rows 10 through 20</td>
<td>A10:E20</td>
</tr>
</tbody>
</table>

Referencing Another Worksheet

You may want to use the value from a cell in another worksheet within the same workbook in a formula. In the following example, the Average worksheet function calculates the average value for the range B1:B10 on the worksheet named Marketing in the same workbook.

The name of the worksheet and the cell reference is separated by an exclamation point.

![Formula example]

Referencing Another Workbook

Excel allows you to reference data in other workbooks but instruction on how is not covered in this lesson.
Overview of an Excel Function

Functions, which are formulas “built-in” to Excel, are often a more efficient way of performing mathematical operations.

Microsoft Excel provides over 200 built-in functions.

The steps for entering a function are outlined below:
Click the cell in which you want to display the results of the function.

1. Press \[ = \].
2. Enter the Function Name into the cell by one of the methods described in the table on the following page.
3. Select or enter the Function Arguments (cell references to be used in the calculation enclosed in parentheses).
4. Press [Enter].

Methods for Entering Functions

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual Method</td>
<td>Use the Keyboard Only Type the entire function directly into the cell.</td>
</tr>
<tr>
<td>Point Method</td>
<td>Use the Keyboard and Mouse Type the function name and the left parentheses, use the mouse to select the range(s) as the argument(s), separating multiple arguments with commas, and type the right parentheses.</td>
</tr>
<tr>
<td>AutoSum Feature</td>
<td>Use the AutoSum feature Click the AutoSum drop-down arrow button located on the Standard toolbar to display a list of functions to select from.</td>
</tr>
<tr>
<td>Insert Function Wizard</td>
<td>Use the Insert Function Wizard Select Insert &gt; Function from the Menu bar or click the Insert Function button on the Formula bar to open the Insert Function dialog box (Wizard) and select from a list of all available functions.</td>
</tr>
</tbody>
</table>
The AutoSum Feature

The functions listed and described in the table below are the most commonly used functions. These functions can be applied using the AutoSum icon on the toolbar:

- AutoSum (addition) is the default.
- Click on the arrow next to the icon to access the menu for other auto-functions.

<table>
<thead>
<tr>
<th>Function</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum</td>
<td>=SUM(A4:A10)</td>
<td>Adds the values in cells A4 through A10.</td>
</tr>
<tr>
<td>Average</td>
<td>=AVERAGE(B1:B2)</td>
<td>Calculates the mean average of the values in cells B1 through B2.</td>
</tr>
<tr>
<td>Minimum</td>
<td>=MIN(C5:C20)</td>
<td>Finds the minimum value of the values in cells C5 through C20.</td>
</tr>
<tr>
<td>Maximum</td>
<td>=MAX(D1:D10)</td>
<td>Finds the maximum value of the values in cells D1 through D10.</td>
</tr>
<tr>
<td>Count</td>
<td>=COUNT(A2:A18)</td>
<td>Finds the number of numeric entries in cells A2 through A18.</td>
</tr>
</tbody>
</table>

To use the AutoSum Feature:

1. Click into the cell where you would like the result to display.
2. Click the AutoSum button.
3. Excel selects the range of data it believes you wish to work with. If Excel has chosen the correct range, press [Enter].
4. If Excel has chosen the incorrect range, simply click and highlight the correct range, and then press [Enter].
Copying Formulas Using AutoFill

You often will want to use the same formula or function multiple times in the same worksheet. Using AutoFill will save you time because you won’t have to retype the formula or function over and over.

You can quickly and easily copy formulas into adjacent cells by using the **AutoFill Handle** (the small black square in the lower-right corner of the selection).

**To copy a formula using AutoFill:**

1. Click anywhere inside the cell that you want to copy to select it.
2. Rest the mouse pointer on the **Fill Handle** at the lower-right corner of the selected cell.
3. The mouse pointer will change to a solid cross.
4. Once the pointer has changed to a solid cross, click and hold the mouse button down and drag the **Fill Handle** to the adjoining cell(s) that you want to copy into.
5. Release the mouse button. Excel fills the cell(s) with the copied formula using relative referencing.

To copy a formula to a nonadjacent cell, use any of the copy/paste functions described on page 5.

Editing and Deleting Formulas and Functions

**To change cell references in a formula:**

1. Double-click the cell that contains the formula you want to change.
2. Do one of the following:
   - To move a cell or range reference to a different cell or range: drag the color-coded border of the cell or range to the new cell or range.
   - To include more or fewer cells in a reference: drag a corner of the border.
   - In the formula, select the reference, and type a new one.
3. Press **[Enter]**.

⚠️ When you enter or edit a formula in Microsoft Excel, cell references and the borders around the corresponding cells are color-coded to guide you.

**To delete a formula:**

1. Click the cell that contains the formula.
2. Press **[Delete]**.
Absolute vs. Relative Referencing

Relative Referencing

When a formula contains relative referencing and it is copied from one cell to another, Excel does not create an exact copy of the formula. It will change cell addresses relative to the row and column they are moved to. If you copy the formula across rows or down columns, the reference automatically adjusts.

By default, new formulas use relative references. For example, if you insert a formula in cell B3 which references cell A3, when you copy it to cell B4 the formula automatically adjusts from =A3 to =A4.

When you do not want this to happen, you need to reference your cell using absolute referencing.

Absolute Referencing

An absolute cell reference in a formula, such as $A$1, always refer to a cell in a specific location. If the position of the cell that contains the formula changes, the absolute reference remains the same. If you copy the formula across rows or down columns, the absolute reference does not adjust.

To create an absolute reference, place dollar signs "$" within the cell addresses in the formula.

For example:

<table>
<thead>
<tr>
<th>Referencing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$A$1</td>
<td>As this formula is copied, it will always reference the contents of column A, but the row may vary if the formula is copied down to a different row.</td>
</tr>
<tr>
<td>A$1</td>
<td>As this formula is copied, it will always reference the contents of row 1, but the column may vary if the formula is copied across the spreadsheet.</td>
</tr>
<tr>
<td>$A$1</td>
<td>Regardless of where the formula is copied, it will always reference the contents of cell A1 in column A, row 1.</td>
</tr>
</tbody>
</table>
Using the Insert Function Wizard

It is helpful to use the **Insert Function** wizard when you are not sure what function to use or when you need assistance stepping through the function.

To access the wizard, choose **Insert > Function** from the Menu bar or click the **Insert Function** button on the Formula bar.

The table and illustration below describes the **Insert Function** dialog box.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Search for a function</td>
</tr>
<tr>
<td>b</td>
<td>Select a category</td>
</tr>
<tr>
<td>c</td>
<td>Select a function</td>
</tr>
<tr>
<td>d</td>
<td>Description</td>
</tr>
<tr>
<td>e</td>
<td>Help on this function</td>
</tr>
</tbody>
</table>
Function Arguments

After you choose a function, the Function Arguments dialog box will open, providing you with a text box(es) into which you insert the necessary cell range(s).

The Collapse Button

If you are not sure what cell reference to use, click on the Collapse button to return to the spreadsheet where you can directly select cell ranges with the mouse rather than typing. Once you have made your selection click the Restore button to reopen and return to the dialog box.

You may also switch to another worksheet to make your selection.

Insert Function Wizard Steps

1. Select the cell you want to contain the function.
2. Click the Insert Function button on the Formula bar.
3. Search for an appropriate function or click the select a category drop-down arrow and:
   • Select All to display a listing of all available Excel functions or
   • Select a more specific category based on the function you wish to use
4. From the Select a function list box, select the desired function.
5. Click OK.
6. The Function Arguments dialog box appears.
7. In the Number text box, type the value and/or cell references to be used in the function or use the Collapse button to select the range with your mouse.
8. Click OK.
9. The Function Arguments dialog box closes. Excel calculates and enters the result in the cell.
Lesson 3

Microsoft Excel for Grading: Useful Functions
**AVERAGE (Mean)**

Finds the average (mean) value of all the values in a specified range of cells.

=\text{AVERAGE}(\text{range})

- Average can be calculated using the AutoSum Feature (see page 12).

> When calculating an average, Excel will ignore any cell that is blank. Make sure to enter a zero if the cell should be included in the calculation.

**MAX**

Finds the maximum (largest) value of all the values in a specified range of cells.

=\text{MAX}(\text{range})

- Max can be calculated using the AutoSum Feature (see page 12).

**MIN**

Finds the minimum (smallest) value of all the values in a specified range of cells.

=\text{MIN}(\text{range})

- Min can be calculated using the AutoSum Feature (see page 12).

**MEDIAN**

Finds the value for which half of all the values are greater and half are lesser in value in a specified range of cells.

=\text{MEDIAN}(\text{range})

**MODE**

Finds the most common value within a specified range of cells.

=\text{MODE}(\text{range})
CONCATENATE

The CONCATENATE function creates a text string by pulling data from specified fields.

=CONCATENATE(text1,text2,...)

- Text1, text2, ... are 1 to 30 items to be joined into a single text item.
- Text items can be text, numbers, or single-cell references.
- To add supplementary text between fields, type the text in quotation marks.
- To add a space between fields, type " ".

Grading example:

Concatenate is useful for joining first and last names into one cell.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Last Name</td>
<td>First Name</td>
<td>Full Name</td>
</tr>
<tr>
<td>2</td>
<td>Silva</td>
<td>Serene</td>
<td>Serene Silva</td>
</tr>
</tbody>
</table>

=CONCATENATE(B2," ",A2)

ISBLANK

The ISBLANK function tests whether a certain cell is blank (empty). If the cell is blank the result will be “true”. If the cell is not blank the result will be “false”.

=ISBLANK(cell)

- ISBLANK evaluates a single cell not a range of data.
The **IF** Function checks a condition that must be either true or false. If the condition is true, the function returns one value. If the condition is false, the function returns another value.

The function has three arguments:

1. The condition you want to check.
2. The value to return if the condition is true.
3. The value to return if the condition is false.

**IF(logical_test,value_if_true,value_if_false)**

- **Logical_test** is any value or expression that can be evaluated to TRUE or FALSE.
- **Value_if_true** is the value that is returned if logical_test is TRUE.
  - Value_if_true can be another formula.
- **Value_if_false** is the value that is returned if logical_test is FALSE.
  - Value_if_false can be another formula.

**Grading examples:**

<table>
<thead>
<tr>
<th>Formula</th>
<th>Description (Result)</th>
</tr>
</thead>
<tbody>
<tr>
<td>=IF(A2&lt;=1.67,&quot;Needs Help&quot;,&quot;OK&quot;) where A2 is the GPA</td>
<td>If the number (GPA) is less than or equal to 1.67, then the text &quot;Needs Help&quot; displays, otherwise, the text &quot;OK&quot; displays.</td>
</tr>
<tr>
<td>=IF(F2&gt;D2, (F2+D2/2), D2) where D2 is score of Exam 1 and F2 is the score of Exam 2</td>
<td>If the number in F2 (Exam 2) is greater than the number in D2 (Exam 1), add the two exams together and divide by 2 (the average of the two exams). If the score of Exam 2 is not greater than the score of Exam 1, use the score from Exam 1</td>
</tr>
</tbody>
</table>
**COUNT and COUNTA**

Counts the number of entries in a range of cells.

=COUNT(range)

- COUNT is included as an AutoSum Feature (see page 12).
- COUNT WILL NOT count blank cells or cells that contain text.

=COUNTA(range)

- Use COUNTA to evaluate cells that contain text.

**Grading example:**

COUNT is useful if you have a large class and want to determine how many students have turned in a particular assignment.

**COUNTBLANK**

Counts the number of blank cells in a particular range.

=COUNTBLANK(range)

**Grading example:**

COUNTBLANK is useful if you have a large class and want to determine how many students have NOT turned in a particular assignment.

**COUNTIF**

Counts the number of cells that are the same as a particular search string.

=COUNTIF(range, “string”)

**Grading example:**

Using COUNTIF, you can set up a grid to view the distribution of letter grades. This is useful if you are grading against a curve.

=COUNTIF(range, “A-“)
=COUNTIF(range, “A”)
=COUNTIF(range, “B+”)

23
STDev - Standard Deviation

Standard deviation measures the spread of data about the mean, measured in the same units as the data.

=STDev(arguments)

Grading example:

Calculating the standard deviation is useful when analyzing student scores and assigning grades against a curve.

*Compare individual scores to the standard deviation using the following formula:*

Student's Score – average of all scores / standard deviation
Lesson 4

More Microsoft Excel for Grading
Calculating a Weighted Mean (Average)

A weighted mean is the average of a collection of scores/values that have been assigned different degrees of importance.

**Example (based on a 100 point scale):**

Your course may have two papers and a final exam; you may want each paper to count for 15% of the final grade and the exam to carry more weight, 70% of the final grade.

If the student scores 86, 94, and 80 respectively, his/her final grade would be an 83.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Student</td>
<td>Paper</td>
<td>Paper</td>
<td>Final Exam</td>
<td>Weighted Mean</td>
</tr>
<tr>
<td>2</td>
<td>Smith</td>
<td>86</td>
<td>94</td>
<td>80</td>
<td>83</td>
</tr>
</tbody>
</table>

To figure the weighted average, multiply each score by the percent of the final grade and then add each result together.

\[
(86 \times .15) + (94 \times .15) + (80 \times .7) = 83
\]

If you are not comfortable converting to decimals, you can use the following formula:

\[
\frac{(score \times percent) + (score \times percent) + (score \times percent)}{100} = \frac{(86 \times 15) + (94 \times 15) + (80 \times 70)}{100} = 83
\]

Using the table above, the formula would be written as:

\[
=(B2 \times .15) + (C2 \times .15) + (D2 \times .7)
\]

Sometimes it is useful to enter each “weight” as a row in the table:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Student</td>
<td>Paper</td>
<td>Paper</td>
<td>Final Exam</td>
<td>Weighted Mean</td>
</tr>
<tr>
<td>2</td>
<td>Weight</td>
<td>.15</td>
<td>.15</td>
<td>.7</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Smith</td>
<td>86</td>
<td>94</td>
<td>80</td>
<td>83</td>
</tr>
</tbody>
</table>

The formula would than be written as:

\[
=(B3 \times B2) + (C3 \times C2) + (D3 \times D2)
\]

If your grading is sometimes based on 100 but not always, you will first need to convert the data to the 100-point scale (100%).
Converting to Percentage

If you have assignments with different total possible points, it is often helpful to standardize them all to a percent scale. To do this, you need to divide each student’s score by the total possible points for that assignment and then multiply by 100.

Example:

Student A receives a 12 on a quiz with a total possible score of 14.

\[ \frac{12}{14} \times 100 \]

\[ = 86 \text{ (rounded to the nearest whole number)} \]

To calculate a weighted mean with items that have different point scales, use the formula described above combined with the formula for calculating a weighted average.

\[ \frac{12}{14} \times 100 \times .15 + \frac{19}{25} \times 100 \times .15 + 85 \times .3 + 83 \times .4 \]

\[ = 83 \text{ (rounded to the nearest whole number)} \]

The result of 83 is returned in Excel when numbers are formatted for 0 decimal places using Format>Cells>Number Tab.

The formula would be written as:

\[ \frac{(B3/B1 \times 100 \times B2) + (C3/C1 \times 100 \times C2) + (D3/D1 \times 100 \times D2) + (E3/E1 \times 100 \times E2)}{B1} \]

Since two of the items are already based on a 100-point scale, the formula could be shortened to:

\[ \frac{(B4/B2 \times 100 \times B3) + (C4/C2 \times 100 \times C3) + (D4 \times D3) + (E4 \times E3)}{B2} \]

If you haven’t entered the scale and weight as a row in your worksheet, you would write the formulas as follows:

\[ \frac{(B4/14 \times 100 \times .15) + (C4/25 \times 100 \times .15) + (D4 \times .3) + (E4 \times .4)}{B4} \]
Dropping Low Scores

Dropping the Lowest Score

Dropping the lowest homework or quiz score before calculating an average is a common grading practice.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Student</td>
<td>HW 1</td>
<td>HW2</td>
<td>HW3</td>
<td>HW4</td>
</tr>
<tr>
<td>2</td>
<td>Smith</td>
<td>95</td>
<td>87</td>
<td>85</td>
<td>83</td>
</tr>
</tbody>
</table>

If you would like to find an average for homework assignments after dropping the lowest score, you would use the following:

\[=\left(\text{SUM}(B2:E2)-\text{MIN}(B2:E2)/3\right)\]

CAUTION:

Be careful to consider Order of Operations.

\[=\text{SUM}(B2:E2)-\text{MIN}(B2:E2)/3\]

will result in a very different answer than:

\[=(\text{SUM}(B2:E2)-\text{MIN}(B2:E2))/3\]

The Function SMALL

Excel’s SMALL function is useful if you would like to determine the second or third lowest score. The syntax of the SMALL function is:

\[=\text{SMALL}(\text{range},n)\] where n represents the nth smallest number in the data set.

In the example above the SMALL function =SMALL(B2:E2, 2) would result in the score: 85 (the second lowest grade).

Dropping the 2 Lowest Scores

Using the sample above, if you would like to drop the two lowest grades before calculating an average the formula would be:

\[=\left(\text{SUM}(B2:E2)-\text{MIN}(B2:E2)-\text{SMALL}(B2:E2,2))/2\right)\]
Using VLOOKUP to Assign Letter Grades

You can use VLOOKUP to search a range for a particular score and then substitute that score for a letter grade.

To use the VLOOKUP function to assign letter grades, you must first create a reference (lookup) table. VLOOKUP enables you to search a list for a value in one column and then return a corresponding value from a second column. Therefore our lookup table must be a minimum of two columns.

Create a Reference Table

1. Switch to a blank worksheet.
2. In the first column, enter the cut-off values for the letter grades and in the second column the corresponding letter grade.

CAUTION: The reference table must display in ascending order (lowest score to highest).

3. It is a good idea to name the range of data for easy reference in the function. To name the range:
   a. Select the data in BOTH columns. In our example the range to select is: A1:B12.
   b. Select Insert>Names>Define from the Menu bar and type: grades in the Names in workbook: box
   c. Click Add.
   d. Click OK.
VLOOKUP

The basic syntax of the VLOOKUP function is:

=VLOOKUP(lookup value, lookup table range, value column).

• It is a good idea to use the Insert Function Wizard to guide you.
• The table above and the reference table created and named “grades” is used as an example to illustrate the process.

The wizard asks you complete the following fields:

<table>
<thead>
<tr>
<th>FIELD</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lookup_value</td>
<td>Enter the cell name for the numerical score that you want to change to a letter grade. Enter the cell address or use the Collapse button to select it with your mouse.</td>
</tr>
<tr>
<td></td>
<td>In our example, F2 is entered.</td>
</tr>
<tr>
<td>Table-array</td>
<td>The range that holds the lookup data. Enter the range address. If you have named the range, enter the name or use the Collapse button to select the range with your mouse.</td>
</tr>
<tr>
<td></td>
<td>In our example, the named range: grades is entered.</td>
</tr>
<tr>
<td>Col_index_num</td>
<td>The number of the column that holds the letter grade (To indicate the second column in the range type: 2)</td>
</tr>
<tr>
<td></td>
<td>In our example, 2 is entered.</td>
</tr>
<tr>
<td>Range_lookup</td>
<td>Enter: True or leave the field blank.</td>
</tr>
<tr>
<td></td>
<td>Enter: False if you want to find an exact match instead of a match that falls between a range of values.</td>
</tr>
<tr>
<td></td>
<td>In our example, the field is left blank.</td>
</tr>
</tbody>
</table>

In the example the VLOOKUP function would be entered into cell G2 and would read:

=VLOOKUP(F2,grades,2)

Use AutoFill to copy the function to other cells using relative referencing.
Using COUNTIF to Determine Distribution of Grades

Once you have determined letter grades using VLOOKUP, use COUNTIF to determine the distribution of grades.

1. Select the range of letter grades for each student. In this example the range would be L2:L15.
2. Name the range “lettergrades” (Insert>Names>Define).
3. Switch to the worksheet that displays your grade reference (lookup) table:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>0</td>
<td>F</td>
</tr>
<tr>
<td>60</td>
<td>D-</td>
</tr>
<tr>
<td>63</td>
<td>D</td>
</tr>
<tr>
<td>67</td>
<td>D+</td>
</tr>
<tr>
<td>70</td>
<td>C-</td>
</tr>
<tr>
<td>73</td>
<td>C</td>
</tr>
<tr>
<td>77</td>
<td>C+</td>
</tr>
<tr>
<td>80</td>
<td>B-</td>
</tr>
<tr>
<td>83</td>
<td>B</td>
</tr>
<tr>
<td>87</td>
<td>B+</td>
</tr>
<tr>
<td>90</td>
<td>A-</td>
</tr>
<tr>
<td>95</td>
<td>A</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>L</td>
</tr>
<tr>
<td>Student A</td>
<td>B</td>
</tr>
<tr>
<td>Student B</td>
<td>B+</td>
</tr>
<tr>
<td>Student C</td>
<td>C</td>
</tr>
<tr>
<td>Student D</td>
<td>B+</td>
</tr>
<tr>
<td>Student E</td>
<td>C</td>
</tr>
<tr>
<td>Student F</td>
<td>B</td>
</tr>
<tr>
<td>Student G</td>
<td>B-</td>
</tr>
<tr>
<td>Student H</td>
<td>A-</td>
</tr>
<tr>
<td>Student I</td>
<td>A</td>
</tr>
<tr>
<td>Student J</td>
<td>C</td>
</tr>
<tr>
<td>Student K</td>
<td>B</td>
</tr>
<tr>
<td>Student L</td>
<td>B-</td>
</tr>
<tr>
<td>Student M</td>
<td>A-</td>
</tr>
<tr>
<td>Student N</td>
<td>B</td>
</tr>
</tbody>
</table>

4. In column C, use COUNTIF to count the distribution of each grade. Enter the function once and then use AutoFill to copy it to the other grades.

=COUNTIF(lettergrades,B2)

5. Use AutoFill to copy the function for each grade.

Use Excel’s Chart Wizard to quickly chart the grade distribution.

1. Highlight the range of grades and counts. (B1:C12)
2. From the Insert menu, select Chart.
3. Step through the Chart Wizard.
Creating a Histogram

Using Excel’s Add-On Analysis ToolPak, you can easily create a histogram for a range of numerical scores.

Loading the Analysis ToolPak

Open the Tools menu. If you do not see Data Analysis listed (near the bottom), select Add-Ins. In the Add-Ins dialog box, click the checkbox next to Analysis ToolPak and then click OK.

Input Range

The illustration at right depicts the range of exam scores. This is the data that will be evaluated. This is the Input Range.

Create a Bin Range

First you need to create a Bin Range. The Bin range represents the values for which we want frequency counts. Determine the highest and lowest values in the Input Range data. You can use the MIN and MAX functions.

Once you have determined the highest and lowest values, use AutoFill to automatically create the Bin values:

1. Type the minimum (smallest) value. In our sample type: 7.
2. Select Edit > Fill > Series from the Menu bar.
4. In the Step value field, enter the increment you would like to use (1, 2, etc.). For the example, enter: 1.
5. In the Stop value: field type the highest value in your Input Range or a number close to that value. For the example, enter: 15.
6. Click OK.

The series will AutoFill:
Creating the Histogram

1. Select **Tools > Data Analysis** from the Menu bar.

2. Select **Histogram** from the list and click **OK**. The Histogram dialog box will open.

3. Use the Collapse button to select the **Input** range with your mouse.

4. Use the Restore button to return.

5. Use the Collapse button to select the **Bin** range.

6. Use the Restore button to return.

7. Under **Output Options**, select where you want the frequency table and chart to be placed. You can use the Collapse button to select a cell in your current worksheet (under your Input and Bin data) or you can select to have the Output placed on a new worksheet.

8. Make sure to select **Chart Output**.

9. Click **OK**.

The frequency table and chart (histogram) will display where you specified.

<table>
<thead>
<tr>
<th>Bin</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>More</td>
<td>0</td>
</tr>
</tbody>
</table>
Freeze Panes

When you are dealing with a large class it is helpful to keep the titles of the columns and the names of the students visible at all times. You can accomplish this by using **Freeze Panes**.

1. Click into the cell that is after the column and below the row, which you would like to freeze.
2. Click **Window>Freeze Panes**.
3. No matter where you scroll on the worksheet, the contents of these cells will remain visible.

Printing Tips

Set Print Area

To print out a portion of a worksheet (e.g., certain columns) you can set a print area.

1. Highlight the range of data you want to print.
2. Select **File>Print Area** from the Menu bar.
3. Select: **Set Print Area**.
4. Use print preview to verify what will print.

To remove the print area

1. Select: **File>Print Area** from the Menu bar.
2. Select: **Clear Print Area**.

Printing Header Rows and Columns

If your class has more students than fit on a single printed page, you will want to print out the column headers on each page.

Also, if you have more assignments than fit on one printed page, you may want to print student-identifying information on each page.

1. Select **File>Page Setup** from the Menu bar.
2. Choose the tab labeled: **Sheet**.
3. Click into the field labeled: **Rows to repeat at the top**.
4. Use the Collapse button to return to the worksheet to select the Row(s) you would like to repeat.
5. Click the Restore button to return to **Page Setup**.
6. Click into the field labeled **Columns to repeat at left**:
7. Use the Collapse button to return to the worksheet to select the column(s) you would like to repeat.
8. Click the Restore button to return to **Page Setup**.
Obtaining a Class List through Agora

Class lists in Excel can be obtained from Agora.

1. Open your Web browser and go to: https://agora.bc.edu
2. Log in with your BC username and password.
3. From under “My Services”, select Course Rosters/Photos.
4. From the dropdown menu next to your desired course, select Get a Course Roster....
5. Select your preferred format.
6. Check the choice for: Other options: Also send as excel enclosure to my e-mail account.
7. Click: Get Course Roster.

Your class list in an Excel worksheet will be emailed to you as an attachment. The name of the file will be the same as the class code. Look for a message from: Web Server.
Activities
Activity 1
Use Excel Basics to Cleanup the Class Roster and Add Final Grade Criteria

1. Open the file named: Excel Grading.xls.
2. Click on the worksheet tab named: Roster.
   This worksheet contains sample data and approximates a class roster downloaded from Agora.
   
   **NOTE**: Instructions for obtaining a class roster through Agora can be found on page: 33 of the Excel for Grading coursebook.

3. Select column A by clicking the heading.
4. Select Edit> Delete from the Menu Bar.
   
   The Student Eagle ID data is now in Column A.

5. Select columns D through M using the “First, Shift, Last” method.
   a. Click on the Column D header,
   b. Press and hold the [Shift] key down.
   c. Click on the Column M header.
   d. Release the mouse button
   
   Columns D through M should now be selected.

6. Select Edit>Delete from the Menu Bar.
7. Add the column labels using the this table as a guide:

<table>
<thead>
<tr>
<th>Cell</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td>Quiz 1</td>
</tr>
<tr>
<td>E1</td>
<td>Quiz 2</td>
</tr>
<tr>
<td>F1</td>
<td>Quiz 3</td>
</tr>
</tbody>
</table>

8. Click on the Heading for Row 1.
9. Apply formatting by clicking on the **Bold** icon on the toolbar.
Activity 2
Enter a Formula and Explore Order of Operations

1. Click on the worksheet tab named: Practice in the file named: Excel Grading.xls.

2. If you have already used the worksheet to practice, clear all data.
   Select the entire sheet by clicking in the box to left of Column Heading A and above Row Heading 1.

3. Select Edit>Clear>All from the Menu bar.


5. Type: =3+4*5

6. Hit [Enter]

7. Note the result that displays in Cell B2.

8. Use the Formula bar to edit the formula. Add parentheses around 3+4.
   =(3+4)*5

9. Note the result that now displays in Cell B2.
Activity 3
Use the AutoSum and AutoFill features on Homework Assignment Data

1. Click on the worksheet tab named: Homework in the file named: Excel Grading.xls.
2. Click into Cell G2.
3. Click on the pull down menu next to the AutoSum icon and select Average.
4. Excel selects the correct range (B2:F2)
5. Click the green checkmark on the formula bar.
6. Tab to Cell H2.
7. Click on the pull down menu next to the AutoSum icon and select Max.
8. Excel selects the range B2:G2. Since we do not want to include the Average (Cell G2) in the formula, we need to reselect the range.
   - Click on cell B2 with the mouse button still depressed, drag to cell F2.
9. Release the mouse button and press [Enter].
10. Click into cell I2.
11. Click on the pull down menu next to the AutoSum icon and select Min.
12. Excel selects the range B2:H2. This is not correct.
13. Click the green checkmark.
14. Edit the function in the formula bar so that the range is corrected:
   - Change the “H” to an “F”.
   - =MIN(B2:F2)
15. Click the Green checkmark.
16. Select the range: G2:I2
17. Position your mouse on the lower right corner of cell I2. When the mouse turns into a solid black + sign, click and drag down to Row I5 and then release the mouse button.
Activity 4
Dropping the Lowest Grade

In this exercise, we will step through the formula to drop the lowest grade on our practice spreadsheet of homework assignments. We will then recalculate the average.

We have already found the lowest grade using the MIN function. We now need to find the Sum for all the homework assignments, subtract the lowest and then find a new average based on the new number of assignments (4).

Test your new skills.
Write down what you think the formula will be if we want the result to display in cell J2 with relative referencing.

_______________________________________________________________________

Explanation of the Formula:
First we type an equal sign to indicate to Excel we want to perform a calculation.

=SUM(B2:F2)
We want the sum of the range B2:F2

=SUM(B2:F2)-I2
We then want to subtract the Lowest grade which we found using the MIN formula in cell: I2

=(SUM(B2:F2)-I2)/4
The next step is to divide by the new number of assignments to find the new average (4).

=SUM(B2:F2)-I2
We need to account for the standard mathematical order of operations to prevent the division from occurring first. We accomplish this by placing parentheses. Our formula should read:

1. Click on the worksheet tab named: Homework in the file named: Excel Grading.xls.
2. Click into Cell J2.
3. Enter the formula: =(SUM(B2:F2)-I2)/4
4. Click the green checkmark on the formula bar.
5. Use the AutoFill feature to complete the formula for the other students.
Activity 5
Use Insert Function to Find the Mode for Homework Assignments

The MODE function finds the most common value within the argument.

1. Click on the worksheet tab named: **Homework** in the file named: **Excel Grading.xls**.
2. Select the cell you want to contain the function; Click into Cell **B19**.
3. Click the **Insert Function** button on the Formula bar.
4. Locate the **Mode** function.
   
   *Tip: you can enter “Mode” in the Search field to retrieve it quickly.*
5. From the **Select a function** list box, select Mode.
6. Click **OK**.
7. The **Function Arguments** dialog box appears. In the **Number** text box, you will notice that Excel has anticipated what data you want to use and has filled in a range reference.
8. To verify that this is the correct range and to gain practice using the **Collapse** button, Click the **Collapse** button and select the range for Assignment 1 with your mouse.
9. Click the **Restore** button to return to the Function Argument Window.
10. Click **OK**.
11. The mode of “93” displays in cell **B19**.
12. Use the **AutoFill** feature to fill right, displaying the Mode for the other homework assignments.
The following table is an example of a grading plan based on the data in our practice Excel Workbook.

<table>
<thead>
<tr>
<th>Cell Reference</th>
<th>Item</th>
<th>Total Possible Points</th>
<th>Percent of Final Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>E2</td>
<td>Homework</td>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>F2</td>
<td>Quiz 1</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>G2</td>
<td>Quiz 2</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>H2</td>
<td>Quiz 3</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>I2</td>
<td>Paper</td>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td>J2</td>
<td>Exam</td>
<td>100</td>
<td>40</td>
</tr>
</tbody>
</table>

The formula below changes all the data to a 100 point scale and assigns the percent of the final grade as displayed in the table.

$= (E2 \times 0.10) + (F2/13 \times 100) \times 0.10 + (G2/15 \times 100) \times 0.10 + (H2/15 \times 100) \times 0.10 + (I2 \times 0.20) + J2 \times 0.40$
For additional information on Excel, the following sources are recommended:

- Try the Help menu built into Microsoft Excel.
- Use the free online training and Quick Reference guide for Excel available from Microsoft:
- Learn about Microsoft e-Learning at Boston College
  [http://www.bc.edu/training](http://www.bc.edu/training)

Microsoft’s e-Learning allows Boston College faculty, staff, and students to take advantage of a wide range of online courses that cover Microsoft’s operating systems (XP and Vista) and Office applications (Word, Excel, PowerPoint, etc.) whenever they want. You must be using Windows and Internet Explorer; the Microsoft e-Learning classes are not accessible on a Mac or with any other Web browser.