

CERTIFICATE IN
**BUSINESS OFFICE
 INFORMATION
 SYSTEMS**



Spreadsheets

More number crunching...

Date	Destination	Starting	End	Total miles	Amount
02/09/2005	London	20478	20568	90	36 MSFT
04/09/2005	Birmingham	21004	21364	36	
08/09/2005	Liverpool	21435	21707	27	
12/09/2005	Southampton	21801	21891	9	
15/09/2005	Plymouth	21956	22266	31	
20/09/2005	Manchester	22478	22838	36	
22/09/2005	Glasgow	23481	24001	52	

Certificate in Business Information Systems

Course Team

Professor Ian Chaston - Course Leader
Michelle Rigden - Administrator

Andy Bloomer
Alex Hammerstein
Vicky Hammerstein
Sue Hawker
Paul Mumford
Florise Scully
Trisha Small
Simon Thorpe
Sarah Watson
Tricia Woodgate

Module reference - MTC112

© 2006 Moustraining Limited
Sentinel House • Modbury
Devon • PL21 0XX
Phone 01548 830710 • Fax 01548 830878
<http://www.moustraining.uk.com>

Compiled by Alex Hammerstein
Design and layout by Moustraining Limited

Created January 2006
Version 1.0

This material is copyrighted and all rights are reserved. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form or by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without prior written permission.

We make a sincere effort to ensure the accuracy of the material described herein; however, Moustraining Limited makes no warranty, expressed or implied, with respect to the quality, correctness, reliability, accuracy, or freedom from error of this document or the products it describes. Data used in examples and sample data files are intended to be fictional. Any resemblance to real persons or companies is entirely coincidental.

The names of software products referred to in this manual are claimed as trademarks of their respective companies.



TABLE OF CONTENTS

TABLE OF CONTENTS	3		
INTRODUCTION	5		
Chapters	5		
Tutorials	5		
Chapter Reviews	5		
Operating System and Graphics Used in This Module	5		
How to Use the Tutorials	6		
Download Module Files	6		
PERSONAL DEVELOPMENT PLANNING	7		
CHAPTER 1: MORE FUNCTIONS AND FORMULAS	9		
Tutorial 1-1: Formulas with Several Operators and Cell Ranges	10		
Tutorial 1-2: Using the Insert Function Feature	12		
Tutorial 1-3: Creating and Using Range Names	14		
Tutorial 1-4: Selecting Nonadjacent Ranges and Using AutoCalculate	16		
Tutorial 1-5: Using the IF Function to Create Conditional Formulas	18		
Tutorial 1-6: Using the PMT Function	20		
Tutorial 1-7: Fixing Formula Errors	22		
Tutorial 1-8: Displaying and Printing Formulas	24		
Mathematical Functions	26		
Financial Functions	28		
Date and Time Functions	30		
Statistical Functions	32		
Database Functions	33		
Chapter One Review	34		
CHAPTER 2: WORKING WITH LISTS	37		
Tutorial 2-1: Creating a List	38		
Tutorial 2-2: Working with Lists and Using the Total Row	40		
Tutorial 2-3: Adding Records Using the Data Form and Insert Row	42		
Tutorial 2-4: Finding Records	44		
Tutorial 2-5: Deleting Records	46		
Tutorial 2-6: Sorting a List	48		
Tutorial 2-7: Filtering a List with the AutoFilter	50		
Tutorial 2-8: Creating a Custom AutoFilter	52		
Tutorial 2-9: Filtering a List with an Advanced Filter	54		
Tutorial 2-10: Copying Filtered Records	56		
Tutorial 2-11: Using Data Validation	58		
Chapter Two Review	60		
CHAPTER 3: AUTOMATING TASKS WITH MACROS	65		
Tutorial 3-1: Recording a Macro	66		
Tutorial 3-2: Playing a Macro and Assigning a Shortcut Key to a Macro	68		
Tutorial 3-3: Adding a Macro to a Toolbar	70		
Tutorial 3-4: Editing a Macro's Visual Basic Code ..	72		
Tutorial 3-5: Inserting Code in an Existing Macro...	74		
Tutorial 3-6: Declaring Variables and Adding Remarks to VBA Code	76		
Tutorial 3-7: Prompting for User Input	78		
Tutorial 3-8: Using the If...Then...Else Statement..	80		
Chapter Three Review	82		
CHAPTER 4: WORKING WITH OTHER PROGRAMMES	85		
Tutorial 4-1: Inserting an Excel Worksheet into a Word Document	86		
Tutorial 4-2: Modifying an Inserted Excel Worksheet	88		
Tutorial 4-3: Inserting a Linked Excel Chart in a Word Document	90		
Tutorial 4-4: Inserting a Graphic into a Worksheet	92		
Tutorial 4-5: Opening and Saving Files in Different Formats	94		
Chapter Four Review	96		
INDEX	99		

Sample Module Content



Welcome to the CertBOIS module: Spreadsheet II - More Number Crunching.

As with all the CertBOIS course material, the student manuals follow a common format and design:

Chapters

Each module is divided into several chapters. If you are not sure if you're ready for a chapter, look at the prerequisites that appear at the beginning of each chapter. They will tell you what you should know before you start the chapter.

Tutorials

Each chapter contains several tutorials on related topics. Each tutorial explains a new skill or topic and contains a step-by-step exercise to give you hands-on-experience.

Chapter Reviews

A review is included at the end of each chapter to help you absorb and retain all that you have learned. This review contains a brief recap of everything covered in the chapter's tutorials, review questions to assess how much you've learned and which tutorials you might want to look at again.

Operating System and Graphics Used in This Module

This module has been written based on a computer running the Windows XP operating system. There are four current versions of Windows operating system: Windows ME, Windows 2000, Windows NT and Windows XP (itself available in both Home and Professional versions).

Similarly, Microsoft Excel, used within this module, is currently available in three versions: Excel 2000, Excel XP (sometimes referred to as Excel 2002) and Excel 2003.

Whilst most of the commands used in this module are common to all versions, some will vary, as will the graphics displayed on the screen. Where there is significant difference in either what is displayed, or in functionality, this will be indicated and an explanation given.

How to Use the Tutorials

Wherever possible every topic is presented on two facing pages, so that you can concentrate on the tutorial without having to worry about turning the page. Since this is a hands-on course, each tutorial contains an exercise with step-by-step instructions for you to follow.

To make learning easier, every exercise follows certain conventions:

- Anything you're supposed to click, drag, or press appears **like this**.
- Anything you're supposed to type appears **like this**.
- This module never assumes you know where (or what) something is. The first time you're told to click something, a picture of what you're supposed to click appears either in the margin next to the step or in the illustrations.
- When you see a keyboard instruction like "press **<Ctrl> + **," you should press and hold the first key (<Ctrl> in this example) while you press the second key (in this example). Then, after you've pressed both keys, you can release them.
- There is usually more than one way to do something in Excel. The exercise explains the most common method, while the alternate methods appear in the margin. Use whatever approach feels most comfortable for you.
- Important terms appear in *italics* the first time they're presented.
- Whenever something is especially difficult or can easily go wrong, you'll see a **NOTE:** immediately after the step, warning you of pitfalls that you could encounter if you're not careful.
- Quick Reference boxes appear at the end of some tutorials. You can use them to review the skills you've learned in the tutorial and as a handy reference—when you need to know how to do something quickly and don't need to go through the sample exercises.

Download Module Files

To help you with the tutorials in this module, we have developed a set of files for you. You will need to download these from our Web site. Using an Internet browser, enter <http://www.moustraining.uk.com/resources> or select Student Resource Centre, then Course Downloads from the main menu. Select the Phase 2 modules link and locate MTC112 in the list of modules. You will be able to download the MTC112.exe file by clicking on the MTC112 link.

You will be asked if you wish to Open or Save the file; select **Save**, and choose the folder to save the file into. Once downloaded, browse to that folder, and double-click the file. It will automatically save the files to your c:\certbois\MTC112 folder.



What is PDP?

Personal Development Planning (PDP) is a process of reviewing your academic and non-academic achievements, reflecting on your progress and identifying some targets for your future development.

How can PDP help me?

PDP helps you:

- become a more effective, independent and confident learner;
- value your own capabilities through greater self-awareness;
- understand more clearly how you learn and how you can improve your performance;
- improve your reflective thinking skills which can strengthen academic performance;
- articulate your skills, personal qualities and competences to employers;
- improve your employability;
- develop greater self-awareness: what you are like, what your strengths and weaknesses are, what you want to achieve;
- make appropriate choices to meet your aspirations.

To help you to engage in the PDP process there are reflective elements built into each of your modules. By completing these and considering other aspects of your life where you are learning and developing professional and transferable skills, you will be able to build a portfolio of evidence of your achievements to which you yourself can refer and which you can present to others

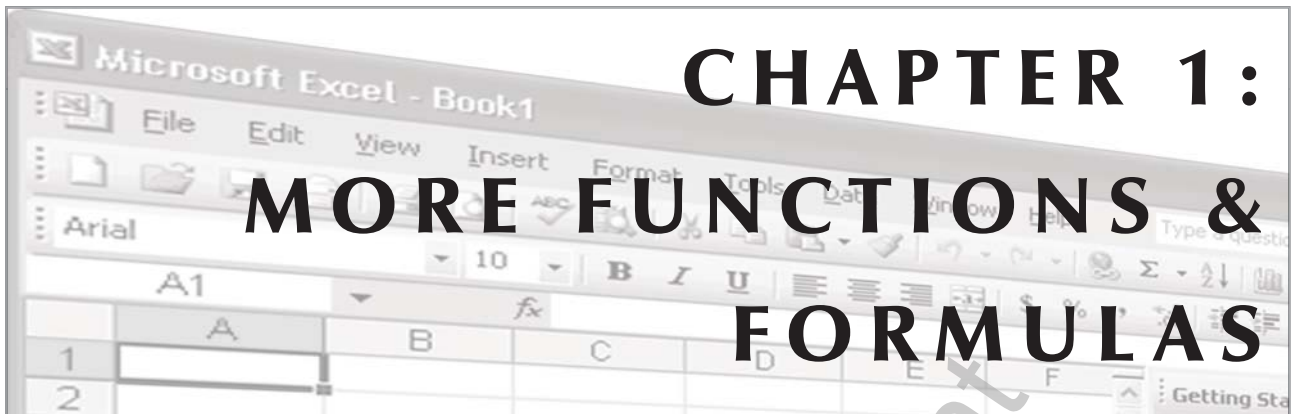
Module: MTC112 – SpreadsheetsII - More number crunching

This module covers skills in:

- Functions and Formulas
- Lists
- Macros
- Working with Other Programs

Prior to starting this module, take a few minutes to think about what you want to gain from completing it. Jot down some notes, overleaf, about your success criteria. In what way do you think this achievement will take you forward in life?

Sample Module Content



Prerequisites

How to use menus, toolbars, dialog boxes and shortcut keystrokes

How to select cell ranges

How to enter values, labels and formulas into a cell

How to reference cells

Chapter Objectives:

- **Create a formula with several operators and cell ranges**
- **Use the Insert Function feature to enter and edit formulas**
- **Create and use range names**
- **Select nonadjacent cell ranges**
- **Use the AutoCalculate feature**
- **Create a conditional formula with the IF function**
- **Use the PMT function**
- **Display and print formulas in a worksheet**
- **Identify and fix formula errors**

Chapter Task: Create payroll and mortgage worksheets

Formulas are the heart and soul of a spreadsheet. Without formulas, Excel would be nothing more than a grid you could use to enter numbers and text. As you will see in this chapter, formulas can do a lot more than just adding, subtracting, multiplying, and dividing. Excel has hundreds of different formulas you can use to create complex statistical, financial and scientific calculations. The most expensive calculator in the world couldn't come close to matching all the functions Excel has.

This chapter is a little different from the others in this module: it's broken into two different parts. In the first part of this chapter, you will become an expert at creating formulas and using different types of functions. The second part of this chapter consist of reference tables of the most commonly used functions, organised by category.

Tutorial 1-1: Formulas with Several Operators and Cell Ranges

We'll start this chapter by creating some more complicated formulas. First let's review: Formulas can contain several values, such as 81 and 3.5; cell references, such as B5 and C1:D11; operators, such as * (multiplication) + (addition); and functions, such as SUM and AVERAGE. When you combine several operations and functions into a single formula, Excel performs the operations in the order shown in *Table 1-1: Order in Which Excel Performs Operations in Formulas*.

When a formula contains several operators with the same precedence, Excel calculates the formula from left to right. You can change the order Excel calculates a formula by enclosing the part of the formula you want Excel to calculate first in parentheses.

You'll get some practice creating formulas with several references and operators in this tutorial by creating formulas to compute employee pension contributions and net pay.

Remember:

All formulas in Excel must begin with an equals sign (=).

- 1. Start Microsoft Excel. Open the workbook **Tutorial 6A** and save it as **Time Sheet**.**
This time card calculates the employees weekly payroll for the Duluth North Shore Travel office. All the information and *almost* all of the formulas are already here; you just need to add a few more formulas to complete the timecard workbook. First, you need to create a formula to calculate how much to deposit to each employee's pension account. North Shore Travel matches the employee's pension contribution, so this formula will be a little trickier than what you're used to.
- 2. Click cell **B16** and type =.**
Typing an equal sign tells Excel that you want to enter a formula.
- 3. Click cell **B14**, type * and click cell **B15** (or you can type B14*B15). *Don't press <Enter> after entering the formula!***
This part of the formula multiplies gross pay (in cell B14) with the percentage the employees want to deduct for their pension contribution (in cell B15.) You're not finished with the formula yet—remember that North Shore Travel matches any pension contributions made by their employees.
- 4. Type *2 and press <Enter>.**
Excel calculates the total pension amount, £50. Copy the formula you have just created to the rest of the row.
- 5. Copy the formula in cell **B16** to the cell range **C16:H16** by clicking the bottom right corner of cell **B16** and dragging across the other cells in the row.**
The worksheet needs one more formula: one to calculate the net pay.
- 6. Click cell **B19**, type = , click cell **B14**, and type - (minus sign).**
Here's where the formula gets tricky. You can't directly subtract the pension amount from cell B16 since it includes both the employee and the company contribution. You will have to calculate the amount of the employee's pension contribution and then subtract it from the gross pay.
- 7. Click cell **B14** (that's right, click cell B14 again) type * click cell **B15** and press <Enter>.**
The formula subtracts the amount of the employee deduction (5% of £500, or £25) from the gross pay. The formula isn't finished yet—you have to go back and subtract the Income Tax and National Insurance amounts.

- Click cell **B19** and click the formula bar and type $-B17-B18$ at the end of the formula. The complete formula should now read $=B14-B14*B15-B17-B18$. Complete the formula by pressing **<Enter>**. Your formula is finished and Excel calculates the net pay for the employee.

Figure 1-1
The completed worksheet

	A	B	C	D	E	F	G	H
1	North Shore Travel							
2	Weekly Time Sheet Summary							
3								
4	For the Week Ending:							
5		Tim Berreau	Brian Kipp	Terry Nordstrom	Harrison Thompson	Bernice Young	Larry Davis	Nancy Smith
6	Monday	8	5	6	5	8	8	8
7	Tuesday	8	5	8	5	8	8	8
8	Wednesday	8	5	8	5	8	8	8
9	Thursday	8	5	0	5	8	8	8
10	Friday	8	5	8	5	8	8	8
11	Total Hours	40	25	30	25	40	40	40
12								
13	Hourly Rate	12.50	15.00	10.50	13.50	15.00	10.50	9.50
14	Gross Pay	500.00	375.00	315.00	337.50	600.00	740.00	340.00
15	Pension Contribution	5.0%	0.0%	2.5%	4.0%	3.0%	0.0%	6.5%
16	Total Pension Amount	£ 50.00	£ -	£ 15.75	£ 27.00	£ 36.00	£ -	£ 44.20
17	Income Tax	75.00	67.50	56.70	60.75	108.00	133.20	61.20
18	Social Security	60.00	56.25	47.25	60.63	90.00	111.00	51.00
19	Net Pay	£ 340.00	£ 251.25	£ 203.18	£ 212.63	£ 384.00	£ 495.80	£ 205.70
20								

- Copy the formula in cell **B19** to the cell range **C19:H19** using the same method as you did in step 5. Compare your worksheet with the one in Figure 1-1.

When you use several operators in a formula, Excel performs the operations in the order shown in the following table. When a formula contains operators with the same precedence—for example, if a formula contains both a multiplication and division operator—Excel calculates them from left to right. To change the order of evaluation, enclose the part of the formula to be calculated first in parentheses. For example, the formula $=(10-5)+(4/2)$ would subtract 5 from 10, then divide 4 by 2, and then add the results.

Table 1-1: Order in Which Excel Performs Operations in Formulas

	Operator	Description
OPERATIONS PERFORMED IN THIS ORDER	()	Parentheses change the order of evaluation. For example: $=(20+5)/(10-5)$ would add 20 and 5 (25), subtract 10 by 5 (5) and then divide the results to equal 5. But... $=20+5/10-5$ would divide 5 by 10 (0.5), add the result to 20 (20.5) and then subtract 5 to equal 15.5.
	:	Reference Operator, for specifying a range of cells.
	%	Percent
	^	Exponentiation
	* and /	Multiplication and division
	+ and -	Addition and subtraction
	= < > <= >=	Comparison



QUICK REFERENCE

To Change the Order in which Excel Performs Operations in Formulas:

- Enclose in parentheses the part of the formula to be calculated first.

Tutorial 1-2: Using the Insert Function Feature

There are several hundred functions available in Excel. Some functions are rather easy to enter, such as the SUM function, while others are much more difficult. For example, the syntax for the DB function, which is used to depreciate an asset, is DB(cost,salvage,life,period,month). You may ask, “How am I supposed to remember that?!”. Luckily, if you use Excel’s Insert Function feature you don’t have to.

The Insert Function feature helps you select, enter, and edit worksheet functions. To use the Insert Function feature all you have to do is click the Insert Function button on the formula bar.

In this tutorial, you will use the Insert Function feature to create a simple AVERAGE formula.

B

Bold button



Insert Function button

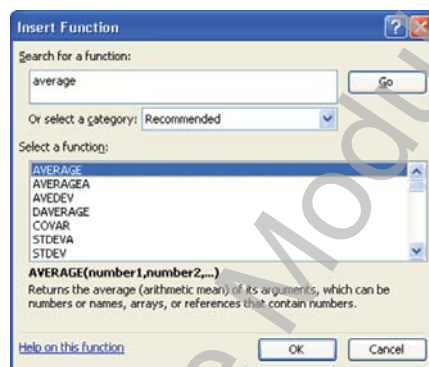
Figure 1-2
The Insert Functions dialog box

1. **If necessary open Workbook Time Sheet. Click cell A20, click the Bold button on the Formatting toolbar, type Average Net Pay and press <Tab>.**

In cell B20 you will use the Insert Function button to help you create a formula that calculates the Average Net Pay.

2. **Click the Insert Function button on the formula bar.**

The Insert Function dialog box appears, as shown in Figure 1-2. Simply type a brief description of what you want a function to do, then click Go. Excel will display a list of functions likely to fit your needs.



3. **In the Search for a function box type average and click Go.**

Excel displays a list of functions that are somehow related to the word ‘average’.

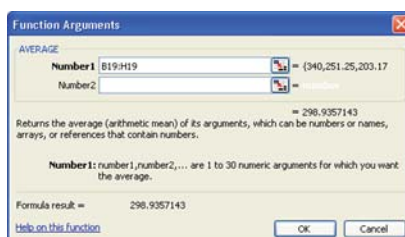
4. **Select AVERAGE from the Function list.**

Notice the bottom of the Insert Function dialog box displays a description and the syntax of the selected function.

5. **Click OK.**

The Insert Function dialog box closes, and the Function Arguments dialog box appears, as shown in Figure 1-3. The AVERAGE function is actually a very simple function—the only arguments (variables or values of a formula) it requires are the numbers you that you want to average.

Figure 1-3
The Function Arguments dialog box





The Collapse Dialog Box button

6. Select the cell range B19:H19.

This range contains the Net Pay for all the employees.

NOTE: If the Function Arguments dialog box is in the way when you want to select a cell or cell range, you can click the Collapse Dialog Box button if any text box to collapse the Function Arguments dialog box and select the cell or cell range.

7. Press <Enter>.

The Function palette completes the formula for you and closes. Cell B20 calculates and displays the average Net Pay amount.

8. Save your work.

The Insertion Function dialog box organises formulas by categories. *Table 1-2: Function Categories* lists and describes the different types of function categories that are available.

Table 1-2: Function Categories

Category	Description
Most Recently Used	Lists the functions you've used most recently.
All	Lists every function available in Excel.
Financial	Lists financial functions to calculate interest, payments, loans, etc.
Date & Time	Lists functions to calculate date and times values.
Math & Trig	Lists maths and trigonometry functions, such as SUM, COS, and TAN.
Statistical	Lists statistical functions to calculate averages, standard deviations, etc.
Lookup & Reference	Lists functions that lookup data or reference values.
Database	Lists functions that lookup data or calculate values in a list or database.
Text	Lists functions that can be used with text or labels.
Logical	Lists IF...THEN functions.
Information	Lists functions that return information about values and the worksheet itself.
User Defined	Lists custom functions that you (or another user) have created.



QUICK REFERENCE

To Use the Insert Function button to Enter or Edit a Formula:

1. Select the cell where you want to enter or edit a formula and click the **Insert Function button** on the formula bar.
2. Select the category of the type of function you want to use from the 'Or select a category' drop-down list.
Or...
 - Type a brief description of the function or formula you want to create and click **Go**.
 - Select the function you want to use from the "Select a function" list and click **OK**.

Tutorial 1-3: Creating and Using Range Names

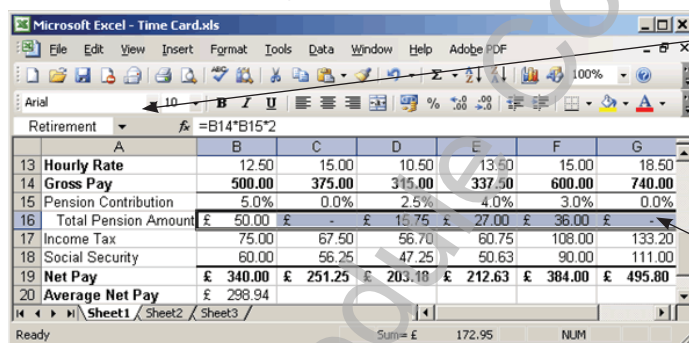
References for cells and cell ranges can sometimes be difficult to read and remember. In the current workbook, what does the cell range B16:H16 refer to? It's the cell range that contains the total pension contributions (both the employee's and employer's) for each employee. Assigning a name to a cell or cell range makes it easier to read, remember, and use in formulas. So instead of totalling the pension contributions with the formula, =SUM(B16:H16), you could use a range name to create the more legible formula, =SUM(Retirement).

This tutorial will show you how to create range names and use them in your formulas. This tutorial also explains how to use column and row heading labels in your formulas, and how Excel can automatically create range names for you.

1. Using workbook *Time Sheet* select the cell range B16:H16.

The selected cell range contains the employer and employee contributions to each employee's pension account. Here's how to give the selected cell range a meaningful name, instead of referring to it as B16:H16.

Figure 1-4
Select a cell range to name



Click the Name Box, type a name, and press <Enter> to name the selected cell or cell range.

The selected cell range, B16:H16, is named Retirement.

2. With the cell range B16:H16 still selected, click the *Name box* in the formula bar, type Retirement and press <Enter>.

Now when you need to reference the pension amounts, you can use the Range Name 'Retirement' instead of the obscure and hard-to-remember cell reference B16:H16.

3. Click cell A21, click the *Bold button* on the Formatting toolbar, type Retirement and press <Tab>.

4. In cell B21, type =SUM(Retirement) and press <Enter>.

Excel calculates the sum of the Retirement range, B16:H16.

Once you create a Named Range you can quickly select it by picking it from the Name box in the Formula bar.

5. Click the *Name box list arrow* and select Retirement.

Excel selects the Retirement range. You don't have to manually create names; you can get Excel to automatically create them for you.

6. Select the cell range A5:H11, and select *Insert* → *Name* from the menu.

Here's a brief summary of what each of the items in the Name submenu does:

- Define: Creates a name for a cell, a cell range, or constant or computed value that you can use to refer to the cell, range, or value. (This is the same as typing it directly in the Name box.) You can also delete any existing names.
- Paste: Inserts the selected name into the formula bar. If the formula bar is active and you begin a formula by typing an equals sign (=), clicking Paste will paste the selected name at the insertion point. If the formula bar is not active, double-

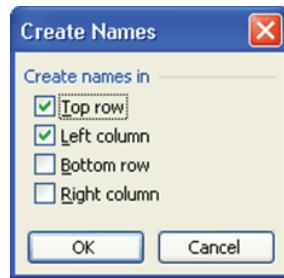
clicking a name in the Paste Name box pastes an equal sign (=) followed by the selected name into the formula bar.

- **Create:** Creates names by using labels in a selected range.
- **Apply:** Searches formulas in the selected cells and replaces references with names defined for them, if they exist.
- **Label:** Creates names for formulas by using text labels from the rows or columns of a selected range.

7. **Select Create from the Name menu.**

The Create Names dialog box appears, as shown in Figure 1-5. The Create Names will automatically create range names based on the current selection.

Figure 1-5
The Create Names dialog box



8. **Verify that the **Top row** and **Left column** check boxes are checked and click **OK**.**

The Create Names dialog box closes, and Excel automatically creates names for the selected cell range. You can verify that Excel created the correct names by clicking the Name box arrow.

9. **Click the **Name Box** list arrow.**

The column heading names should appear in the Name Box list.

10. **Click anywhere in the worksheet window to close the Name Box list.**

You can also use column and row labels in the worksheet to refer to data in formulas—without having to create any names at all!

11. **Click cell **A22**, click the **Bold** button on the Formatting toolbar, type `Max Hourly Rate` and press **<Tab>**.**

12. **In cell **B22**, type `=MAX(Hourly Rate)` and press **<Enter>**.**
Excel returns the maximum value in the Hourly Rate row, 18.50.

13. **Save your work.**

QUICK REFERENCE

To Name a Cell or Cell Range:

1. Select the cell or cell range you want to name.
2. Click the **Name box** on the Formula bar, type the name, and press **<Enter>**.

To Automatically Create Names:

1. Select the cell or cell range you want to name.
2. Select **Insert** → **Name** → **Create** from the menu.
3. If necessary, change the check boxes in the Create Names dialog box.
4. Click **OK**.

To Change the Cell Reference of a Name:

1. Select the new cell or cell range you want to use as the reference.
2. Select **Insert** → **Name** → **Apply** from the menu.
3. Select the name you want to use on the selected reference and click **OK**.

To Delete Names:

- Select **Insert** → **Name** → **Define** from the menu, select the name you want to delete and click **Delete**.

Tutorial 1-4: Selecting Nonadjacent Ranges and Using AutoCalculate

If you have got this far in the book you obviously know how to select and use cell ranges in your formulas. But, how do you select cell ranges that aren't next to each other? That's the first topic explained in this tutorial.

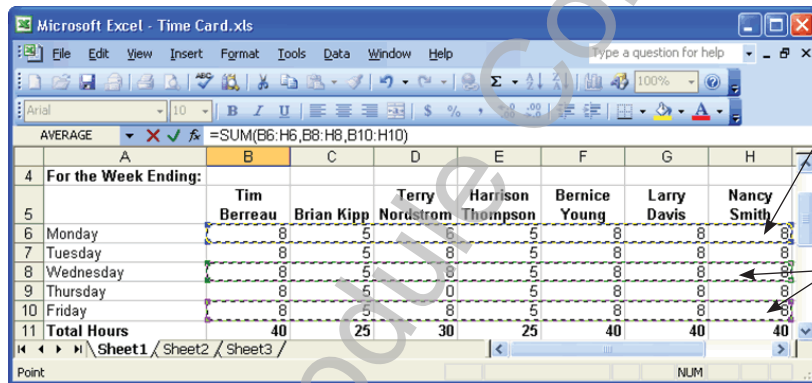
Also covered in this tutorial is Excel's nifty *AutoCalculate* feature, used to calculate a total or average of a cell range without entering a formula.

1. **Open the workbook *Tutorial 6B* and save it as *Time Sheet2*.**
2. **Click cell *A24*, click the **Bold** button on the Formatting toolbar, type *M-W-F* and press **<Tab>**.**

Next you want to total the hours from only the Monday, Wednesday, and Friday rows. You can select several nonadjacent cell ranges by holding down the **<Ctrl>** key when you select the ranges.

3. **Make sure cell *B24* is active and click the **AutoSum** button on the Standard toolbar.**

Figure 1-6
Selecting multiple nonadjacent ranges with the **<Ctrl>** key



Press and hold the **<Ctrl>** key while you select the first cell range then each additional cell or cell range.



AutoSum button

Excel selects the closest cells (*B22* and *B23*) as the arguments for the **SUM** function.

This isn't the cell range you want to use in your formula—you want to find the totals of the Monday, Wednesday, and Friday rows.

4. **Select Monday's cell range, *B6:H6*, press and hold the **<Ctrl>** key, select Wednesday's cell range, *B8:H8*, and then select Friday's cell range, *B10:H10*. Release the **<Ctrl>** button when you've finished.**

The nonadjacent ranges in the Monday, Wednesday, and Friday rows are all selected, as indicated by the shimmering dotted line around each of the columns. Notice the formula bar displays the cell ranges: `=SUM(B6:H6,B8:H8,B10:H10)`.

5. **Press **<Enter>**.**

Excel calculates the total hours for the Monday, Wednesday, and Friday rows.

On to the second topic covered in this tutorial—AutoCalculate. Sometimes you may want to calculate the total of several cells without actually creating a formula. Excel's AutoCalculate makes this incredibly easy—simply select the cell range you want to total, and the calculation is displayed on the status bar.

6. **Select the cell range *B6:H10*.**

The AutoCalculate area of the status bar displays the total of the selected cell range: `Sum=240`. You can also use AutoCalculate to do other simple and quick calculations. To change the calculation type, right-click the AutoCalculate area of the status bar.

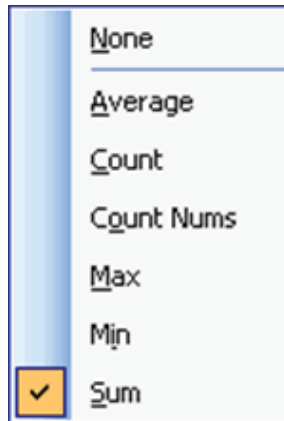
7. Right-click the **AutoCalculate area of the Status bar.**

A shortcut menu appears with a list of the AutoCalculate options:

- None: Disables AutoCalculate.
- Average: Calculates the average of the selected cells.
- Count: Counts the number of non-empty cells.
- Count Nums: Counts the number of cells that contain numbers.
- Max: Returns the largest value in a range of cells.
- Min: Returns the smallest value in a range of cells.
- Sum: Adds all the numbers in a range of cells (the default setting).

You want AutoCalculate to display the average of any selected cells.

Figure 1-7
Shortcut menu list
of AutoCalculate
options



8. Select **Average from the AutoCalculate shortcut menu.**

AutoCalculate calculates the average for the selected cell range. Return AutoCorrect back to the default Sum setting.

9. Right-click the **AutoCalculate area of the Status bar and select **Sum**.**

10. Save your work.

 **QUICK REFERENCE**

To Select Nonadjacent Cell Ranges:

- Select the first cell range, then press and hold the **<Ctrl>** key while you select additional cell ranges.

To Use AutoCalculate:

- Select the cell range you want to total or calculate. The Status bar will display the results.

To Change the AutoCalculate Function:

- Right-click the AutoCalculate area of the Status bar and select the function you want AutoCalculate to use from the shortcut menu.

Tutorial 1-5: Using the IF Function to Create Conditional Formulas

This tutorial introduces a very useful function, the *IF* function. The *IF* function is a *conditional function* or *logical function* because it will evaluate a condition you specify and return one value if the condition is true and another value if the condition is false. For example, you could use the *IF* function in an invoice to create a formula that would subtract a 5% discount from the invoice if the total was more than £500.00, otherwise it wouldn't subtract anything.

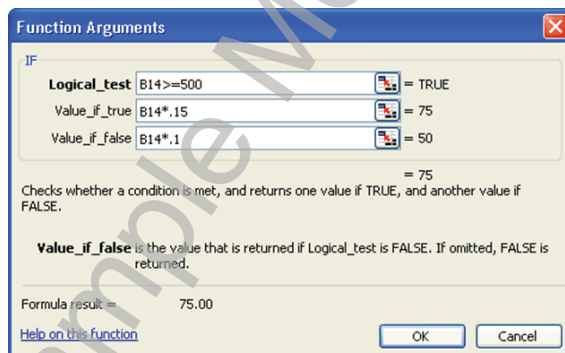
The *IF* function contains three parts, or arguments, as shown in Figure 1-9. Since you can use the Insert Function button to help you create *IF* function formulas, you really don't need to memorise the syntax of the *IF* function.

1. Using workbook **Time Sheet2**, click cell **B17** and press **<Delete>** to clear the cell contents.

The income tax rate changes at different income levels. You have determined that employees who earn £500 or more in a week are subject to a 15% tax rate, while employees who earn less than £500 in a week are subject to a 10% tax rate. You can create a formula using the *IF* function to evaluate the employee's earnings and then multiply it by the appropriate tax rate. The *IF* function is a little more difficult than other functions, so use the Insert Function tool to help you enter it.

2. Click the **Insert Function** button on the **Formula bar**.
3. Select **Logical** in the **Function category** list, select **IF** in the **Function name** list, and click **OK**.

The Function Arguments dialog box appears, as shown in Figure 1-8. You're ready to start entering the *IF* formula.



4. Type **B14>=500** in the **Logical_test** text box.

You just entered the first argument of the *IF* function, which evaluates a statement as true or false (see Figure 1-9). Here you want to evaluate if the value in B14 is equal to or greater than £500.

NOTE: Remember, you can also create cell references by clicking the cell or cell range you want to reference. Click the Collapse Dialog button to collapse the function palette and select the cell range if the Function Arguments dialog box is in the way. The next step is entering the true argument of the *IF* function.



Insert Function button

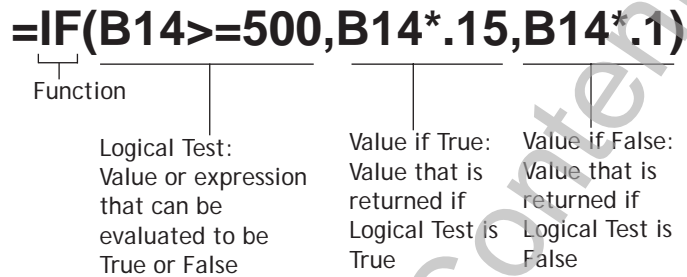
Figure 1-8
Creating a conditional formula using the *IF* function and the Function Arguments dialog box



Collapse Dialog Box button

5. Select the **Value_if_true** text box by clicking it or pressing the **<Tab>** key, and type **B14* .15**.
If the values in B14 is equal to or greater than 500 the IF function will multiply the value in cell B14 by 0.15. Move on to the next step to complete the IF function by entering the Value if false argument—what the function should do if the value is *not* equal to or greater than £500.
6. Move to the **Value_if_false** text box by clicking it or pressing the **<Tab>** key, and type **B14* .1**.
If the value in B14 is less than £500, the IF function will multiply the value in cell B14 by 0.10. Compare your screen with the one shown in Figure 1-9.

Figure 1-9
The syntax for the IF function



7. Click **OK** to complete the formula.
The Function Arguments dialog box closes. The IF function in B17 multiplies the Gross Pay by 15%, since it is equal to or greater than £500.
8. Copy the formula in cell B17 to the remaining cells in row 17.
After copying the IF formula, notice that those columns with Gross Pay less than £500 are multiplied by 10% instead of 15%.
9. Save your work and close the current workbook.

The IF function is one of the more difficult functions, but it's also very powerful and is well worth the effort of learning how to use it.

 **QUICK REFERENCE**

To Use the IF Function in a Formula:

- Write the formula using the syntax =IF(logical_test,value_if_true,value_if_false).

Or...

1. Click the **Insert Function** button on the Formula bar to open the Insert Formula dialog box.
2. Select **Logical** in the Function category list, select **IF** in the Function name list, and click **OK**.
3. Enter the required arguments for the IF function.

Tutorial 1-6: Using the PMT Function

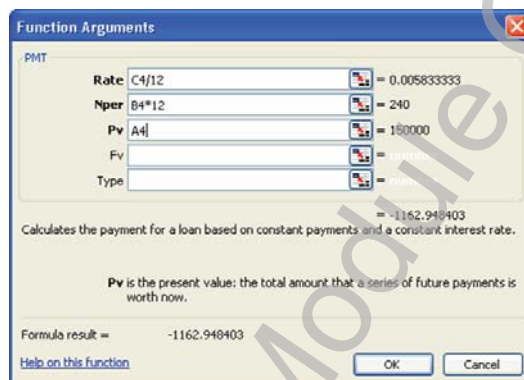
The PMT function is a very valuable function if you work with property, investments, or loans. The PMT function calculates the payment for a loan based on periodic payments and a constant interest rate. For example, say you want to take out a £10,000 car loan at 8% interest and will pay the loan off in four years. You can use the PMT function to calculate that the monthly payments for such a loan would be £244.13. You can also use the PMT function to determine payments to annuities or investments. For example, if you want to save £50,000 in 20 years by saving the same amount each month, you can use PMT to determine how much you must save.

1. **Open the workbook named Tutorial 6C and save it as Mortgage Table.**
All of the information you need to find the monthly payments has already been entered. All you have to do is use the PMT function to calculate the monthly payment. The PMT function is a little complicated, so use the Insert Function feature to help you enter it.
2. **Click cell D4 and click the Insert Function button on the Formula bar.**
3. **Select Financial from the Or select a category list, scroll down the Select a Function list, select PMT, and then click OK.**



Insert Function button

Figure 1-10
The Function Arguments dialog box



The Function Arguments dialog box appears, as shown in Figure 1-10. You're ready to start entering the PMT formula to calculate the monthly mortgage payments. Look at Figure 1-10: the first argument of the PMT function is the interest rate. Since the Function Arguments dialog box is in the way, you'll have to click the Collapse Dialog Box button to see and reference the cells on the worksheet.



Collapse Dialog Box button

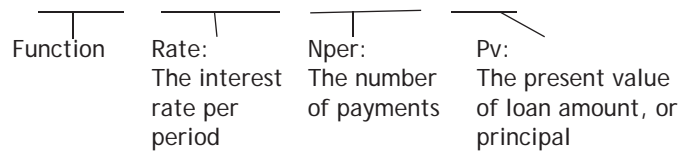
4. **Click the Rate Collapse Dialog Box button, click cell C4, and press <Enter>.**
Because you want to calculate monthly payments instead of annual payments, you will need to divide the annual interest rates by 12.
5. **Type / 12 to divide the annual interest rate.**
C4/12 should appear in the Rate text box. The next argument in the PMT function is the *Nper*—the total number of payments for the loan.
6. **Click the Nper box and type B4 * 12.**
Again, you want to calculate monthly payments so you need to multiply the total number of years by 12. The last step in the PMT formula is entering the *Pv*—the principal.
7. **Click the Pv Collapse Dialog Box button, click cell A4, and press <Enter>.**
You've finished entering the PMT formula so you can close the Function Arguments dialog box.



Enter button

Figure 1-11
The PMT Function

=PMT(C4/12,B4*12,A4)



8. **Click OK.**
The Function Arguments dialog box closes, and the monthly payment, (-£1,162.95), appears in cell D4.
You might ask why is the monthly payment displayed in red (a negative number)? It's because the PMT formula shows the borrower's point of view, and therefore the payments are calculated as a negative cash flow. You can easily change the formula so that it shows a positive number by editing the formula and placing a minus sign just after the equals sign.
9. **Edit the formula in cell D4 by clicking the Formula bar, and adding a - (minus sign) immediately after the = sign, so that the formula reads =-PMT(C4/12,B4*12,A4), then click the Enter button on the Formula bar.**
The PMT formula now displays the monthly payments as a positive number. Copy the formula to find the monthly payments for the other loans.
10. **Copy the formula you have just created to the cell range D4:D6.**
The PMT formula is copied. Cell D5 displays a monthly payment of £1,208.39 and cell D6 displays a monthly payment of £1,048.82. Now that you have calculated the monthly payments for each of the three loans, you can easily calculate even more information, such as the total interest paid and total amount paid on each loan.
11. **Click cell E4, type =, click cell D4, type *, click cell B4, type *12, so that the formula reads =D4*B4*12, and click the Enter button on the Formula bar.**
Now that you know the total amount of all the loan payments, you can find how much the total interest will be.
12. **Click cell F4, type =, click cell E4, type -, click cell A4 and click the Enter button on the Formula bar.**
Wow! That interest really adds up, doesn't it?
13. **Copy the formula in cell E4 into cells E5:E6. Copy the formula in cell F4 into cells F5:F6. Compare your workbook with the one in Figure 1-12.**

Figure 1-14
Using the PMT function to calculate monthly loan payments

	A	B	C	D	E	F
1	Mortgage Payment Table					
2						
3	Loan Amount	Loan Length (in years)	Interest Rate	Monthly Payment	Total Payments	Interest Paid
4	£ 150,000	20	7.0%	£1,162.95	£279,107.62	£129,107.62
5	£ 150,000	20	7.5%	£1,208.39	£290,013.55	£140,013.55
6	£ 150,000	30	7.5%	£1,048.82	£377,575.83	£227,575.83

14. **Try experimenting with different loan amounts, interest rates, and loan lengths for the different loans. Then save your work and close the Mortgage table worksheet.**

QUICK REFERENCE

To Use the IF Function in a Formula:

Write the formula using the syntax PMT(rate,nper,pv)

Or...

1. Click the **Insert Function button** on the Formula bar to open the Insert Formula dialog box.
2. Select **Financial** in the Or Select a Category list, select **PMT** in the Select a Function list, and click **OK**.
3. Enter the required arguments for the PMT function.

Tutorial 1-7: Fixing Formula Errors

Sometimes Excel comes across a formula that it cannot calculate. When this happens, it displays an error value. Error values occur because of incorrectly written formulas, referencing cells or data that doesn't exist, or the fundamental laws of mathematics have been broken.

1. Navigate to your Practice folder and open the workbook Tutorial 6D.

This workbook, (created by a user who is not as proficient in Excel as you are), contains several common errors that you are likely to encounter. Notice that cells B7, B8, B10, and B12 all have a string of #####s in them. Technically, this isn't an error—the numerical information in the cells is just too large to be displayed in the current cell width. To fix the problem you simply need to widen the column.

2. Double-click the line between the B and C column headers.

Excel automatically adjusts the width of the selected column so that it can display the widest cell entry and the #####s disappear.

Excel 2003 includes a useful new feature that checks for errors in your formulas—think of it as spell check for mathematics. Errors are always indicated by a green triangle in the upper left corner of the cell. This indicates that there is an error in the formula.

3. Click cell D5 to select it.

This cell displays #DIV/0!. This error code results when Excel tries to divide a number by zero (which is impossible as it gives an answer of infinity). Notice that a Trace Error button appears next to the cell. The button offers a drop-down list of things you can do to correct the cell.

4. Click the Trace Error button list and select Show Formula Auditing Toolbar from the list.

The Formula Auditing toolbar appears, as shown in Figure 1-13. The Formula Auditing toolbar helps you find cells that have a relationship to a formula, displays formulas affected by changes made to the cell, and tracks down the sources of errors.

Figure 1-13
The Formula Auditing toolbar



Trace Error button

5. Click the Trace Error button on the Formula Auditing toolbar.

An arrow appears from the cells that caused the error to the active cell, D5. Notice cell B5 contains a value, while cell C5 is blank—the source of the #DIV/0! error in cell D5. To fix the error, you must enter a value in cell C5.



Remove All Arrows button

6. Click cell C5, type 1 and press <Enter>. Click the Remove All Arrows button on the Formula Auditing toolbar to remove the tracer arrow.

The error value in cell D5 is replaced by the correct calculation of the formula. Next, look at cell B12, the one that calculates the agent's commission. The commission rate at North Shore travel is 5 percent, so this commission amount seems too large. You can investigate this value by tracing the cell precedents.



Trace Precedents button

7. Click cell B12 and click the Trace Precedents button on the Formula Auditing toolbar.

An arrow appears from the cell range B4:B10 to cell B12. You can now easily see the source of the problem: the cell range includes both the sales totals and the sum of the sales totals, doubling the value used to calculate commission. Fix the error.

8. Edit the formula in cell B12 so it reads =B10*0.05 and press <Enter>.

The formula now calculates a more reasonable commission amount, £731.70. You can close the Formula Auditing toolbar since you've finished using it.

9. Click the **Formula Auditing toolbar's close button to close it.**

Table 1-3: *Excel Error Values* lists the error values Excel displays when it encounters an error and what these rather cryptic-looking error values mean.

Table 1-3: *Excel Error Values*

Error Value	Description
#####	The numeric value is too wide to display within the cell. You can resize the column by dragging the boundary between the column headings.
#VALUE!	You entered a mathematical formula that references a text entry instead of a numerical entry.
#DIV/0!	You tried to divide a number by zero. This error often occurs when you create a formula that refers to a blank cell as a divisor.
#NAME?	You entered text in a formula that Excel doesn't recognize. You may have misspelled the name or function, or typed a deleted name. You also may have entered text in a formula without enclosing the text in double quotation marks.
#N/A	This error occurs when a value is not available to a function or a formula. If certain cells on your worksheet contain data that is not yet available, enter #N/A in those cells. Formulas that refer to those cells will then return #N/A instead of attempting to calculate a value.
#REF!	The #REF! error value occurs when a cell reference is not valid. You probably deleted the cell range referenced to in a formula.
#NUM!	The #NUM! error value occurs when you used an invalid argument in a worksheet function.
#NULL!	You specified an intersection of two ranges in a formula that do not intersect.

 Quick Reference

To Display or Hide the Formula Auditing Toolbar:

Select **Tools** → **Formula Auditing** → **Show Formula Auditing Toolbar**.

To Correct Formula Errors:

Refer to Table 1-3: *Excel Error Values*.

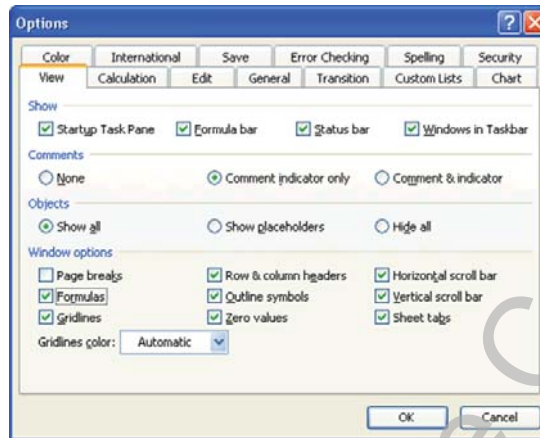
Tutorial 1-8: Displaying and Printing Formulas

Excel normally displays the results of formulas in the worksheet, but not the actual formula. You can choose to have the actual formulas displayed by Excel in the worksheet cells instead of their results, however, and learning how to do that is the topic of this tutorial. Once you display a worksheet's formulas, you can print them for documentation purposes.

1. Select **I**ools → **O**ptions from the menu and click the **V**iew tab.

The View tab of the Options dialog box appears, as shown in Figure 1-14.

Figure 1-14
The View tab of the Options dialog box



2. In the Window options section, check the **F**ormulas check box, then click **O**K.

The Options dialog box closes. Notice that the worksheet columns are expanded, and instead of displaying the results of formulas, they now display the actual formulas, as shown in Figure 1-15. Since the worksheet columns are so wide, you will have to scroll through the worksheet to see all of the formulas.

Figure 1-15
A worksheet with formulas displayed

	A	B	C	D	E
1	Jim's Commissions				
2					
3	Destination	Sales	No. Flights	Average Cost	
4	Las Vegas	684	2	=B4/C4	
5	Atlanta	299		=B5/C5	
6	Toronto	675	4	=B6/C6	
7	Montreal	11158	40	=B7/C7	
8	New York	1568	5	=B8/C8	
9	San Diego	250	1	=B9/C9	
10		Total	=SUM(B4:B9)	=SUM(C4:C9)	
11					
12	Commission		=SUM(B4:B10)*0.05		
13					

3. Scroll the worksheet horizontally, until you can see the F column.

You can also print the worksheet with the formulas displayed. For the formulas to be meaningful when they are printed, however, you need to tell Excel to print the worksheet row number and column letter headings.

4. Select **F**ile → **P**age Setup from the menu and click the **S**heet tab.


Now specify that you want the row and column headings to be printed.

5. Check the **R**ow and column headings check box and click **O**K.

Now preview your worksheet to see how it will look when printed.



Print Preview
button

6. Click the **Print Preview button** on the Standard toolbar. Use the  pointer to zoom in and out of the worksheet.
The worksheet will be printed with the formulas and the row and column headings displayed.
7. Click **Close**.
8. Select **T**ools → **O**ptions from the menu, make sure the View tab is selected, click the **Formulas check box** to deselect it, and then click **OK**.
Excel displays the results of the formulas instead of the formulas themselves.
9. Close the workbook without saving it.

Sample Module Content

 Quick Reference

To Display or Hide Worksheet Formulas:

1. Select **T**ools → **O**ptions from the menu and click the **V**iew tab.
2. Check or uncheck the **Formulas check box**.

Mathematical Functions

You can find any of Excel's mathematical functions on a typical scientific calculator. If you still remember your algebra classes, many of these functions, such as SIN, COS, and LOG may be familiar to you, but don't worry if you don't understand all of them as some are quite complex.

Obviously you aren't expected to learn the following tables, but rather use them as points of reference.

Function	Syntax	Description
ABS	=ABS(number)	Determines the absolute value of a number. The absolute value of a number is the number without its sign (its magnitude).
ACOS	=ACOS(number)	Returns the arccosine of an angle. ACOS is the inverse of the COS function.
ASIN	=ASIN(number)	Returns the arcsine of an angle. ASIN is the inverse of the SIN function.
COMBIN		Calculates the number of possible combinations from a given number of items. Example: You want to form a two-person team from five candidates, and you want to know how many possible teams can be formed. COMBIN(5, 2) equals 10 teams.
COS	=COS(number)	Returns the cosine of an angle (angle must be entered in radians).
DEGREES	=DEGREES(angle)	Converts radians into degrees.
EVEN ODD	=EVEN(number)	Rounds a number up to the nearest even or odd integer.
EXP	=EXP(number)	Calculates the value of the constant e (approximately 2.71828182845904) raised to the power specified by its argument. Example: EXP(2) equals e ² , or 7.389056
FACT	=FACT(number)	Calculates the factorial of a number. The factorial of a number is the product of all the positive integers from one up to the specified number. Example: FACT(5) equals 1*2*3*4*5 equals 120
LN	=LN(number)	Calculates the natural (base e) logarithm of a positive number.
LOG	=LOG(number, base)	Calculates the logarithm of a positive number using a specified base.

Function	Syntax	Description
LOG10	=LOG(number)	Calculates the base 10 logarithm of a number.
MOD	=MOD(number, divisor)	Returns the remainder after number is divided by divisor. Example: MOD(3, 2) equals 1, the remainder of dividing 3 by 2.
PI	=PI()	Returns the value of the constant pi (π), accurate to 14 decimal places.
POWER	=POWER(number, power)	Raises a number to the specified power.
PRODUCT	=PRODUCT(number1, number2...)	Multiplies all the numbers in a range of cells.
RADIANS	=RADIANS(angle)	Converts degrees to radians.
RAND	=RAND()	Generates a random number between 0 and 1.
RANDBETWEEN	=RANDBETWEEN(bottom, top)	Generates a random number between the bottom and top arguments.
ROUND ROUNDDOWN ROUNDUP	=ROUND(number, num_digits)	Rounds a number to a specified number of digits. The ROUNDDOWN and ROUNDUP function take the same form as the ROUND function, and as their name implies, always round either up or down.
SIGN	=SIGN(number)	Determines the sign of a number. Results in 1 if the number is positive, zero (0) if the number is 0, and -1 if the number is negative.
SIN	=SIN(number)	Returns the sine of an angle (angle must be entered in radians).
SQRT	=SQRT(number)	Returns a positive square root of a number.
SUM	=SUM(number1, number2...)	Adds all the numbers in a range of cells. You can enter the SUM function by clicking the AutoSum button on the Standard toolbar.
TAN	=TAN(number)	Returns the tangent of an angle (angle must be entered in radians).

Financial Functions

Excel's financial functions are vital if you work with investments or real estate. Financial functions help determine loan payment amounts, calculate the future value of investments, and find rates of return.

Function	Syntax	Description
FV	=FV(rate, number of periods, payment, present value*, type*)	Calculates the future value of an investment based on periodic, constant payments and a constant interest rate. Example: You plan to deposit £2,000 a year for 35 years into an IRA, and you expect a 10% average rate of return. FV(10%,35,-2000) equals £542,048.74
IPMT	=PMT(rate, period, number of periods, present value, future value*, type*)	Calculates the interest payment for over a specified period of time, with constant periodic payments and a constant interest rate. Example: The following formula calculates the interest due in the first month of a three-year £8000 loan at 10 percent annual interest: IPMT(0.1/12, 1, 36, 8000) equals -£66.67
IRR	=IRR(values, guess)	Calculates the internal rate of return of investments. The investments do not have to be equal, but they must occur at regular intervals. The internal rate of return is the interest rate received for an investment consisting of payments (negative values) and income (positive values) that occur at regular periods. Example: You want to start a business. It will cost £40,000 to start the business, and you expect to net the following income in the first three years: £10,000, £15,000, and £20,000. Enter the four values in the cells A1:A4 of the worksheet, making sure to enter the initial £40,000 investment as a negative value. IRR(A1:A4) equals 5%
NPV	=NPV(rate, value1, value2, ...)	Calculates the net present value of an investment by using a discount rate and a series of future payments (negative values) and income (positive values).

Function	Syntax	Description
PMT	=PMT(rate, number of periods, present value, future value*, type*)	Calculates the payment for a loan based on constant payments and a constant interest rate. Example: The following formula calculates the monthly payment on a £20,000 loan with an annual interest rate of 9% that must be paid in 36-months. PMT(9%/12, 36, 20000) equals (£635.99)
PV	=PV(rate, number of periods, payment, future value*, type*)	Returns the present value of an investment. Example: An annuity that pays £600 every month for the next 20 years costs £50,000, and the money paid out will earn 7%. You want to determine whether this would be a good investment. Using the PV function, you find that the present value of the annuity is: PV(0.07/12, 12*20, 600, , 0) equals (£77,389.50)
RATE	=RATE(total number of payments, payment, present value)	Determines the interest rate per period of an annuity. Example: You want to calculate the rate of a four-year (48 month) £8,000 loan with monthly payments of £200. Using the RATE function you find: RATE(48, -200, 8000) equals 0.77 percent This is the monthly rate, because the period is monthly. The annual rate is 0.77%*12, which equals 9.24 percent.

* Optional arguments.

Date and Time Functions

You can use dates and time in your formulas just like any other value. For example, if cell A1 contained the entry 1/5/05 you could use the formula =A1+100 to calculate the date 100 days later, which is 9/8/05.

One very important thing to know about working with date and time functions: while Excel can display dates and times using just about any format, it actually stores dates as chronological numbers called *serial values*. So when you think of dates as days, months, and years, such as 1 May, 2005, Excel thinks of dates in terms of serial numbers, such as 36281.

NOTE: Since the following date and time formulas often return serial number values, you should format any cells with date or time formulas with data and time formats that you can easily understand. You can also create custom number formats to display the results of date formulas. For example, the custom format dddd would display only the day, Monday, instead of the entire date, 9/8/05.

Function	Syntax	Description
DATE	=DATE(year, month, day)	Enters a date in the cell. Example: DATE(05,5,1) equals 1st May, 2005.
TODAY	=TODAY()	A special version of the DATE function. While the DATE function can return the value of any date, the TODAY function always returns the value of the current date.
TIME	=TIME(hour, minute, second)	Enters a time in the cell. Uses a 24-hour (military) time system. Example: TIME(14,30,00) equals 2:30 PM.
NOW	=NOW()	A special version of the TIME function. While the TIME function can return the value of any time, the NOW function always returns the value of the current time.
WEEKDAY	=WEEKDAY(serial_number, return_type)	Returns the day of the week corresponding to a date. The day is given as an integer, ranging from 1 (Sunday) to 7 (Saturday), by default. The serial_number argument is a date value (or reference to one). Example: WEEKDAY("14/2/06") equals 4 meaning Wednesday.
YEAR	=YEAR(serial_number, return_type)	Returns a value of the year for a specific date. The serial_number argument is a date value (or reference to one). Example: YEAR("15/3/2005") equals 2005.

Function	Syntax	Description
MONTH	=MONTH (serial_ number, return_ type)	Returns a value of the month for a specific date. The month is given as an integer, ranging from 1 (January) to 12 (December). The serial_number argument is a date value (or reference to one). Example: MONTH("15/3/2005") equals 3.
DAY	=DAY(serial_ number, return_ type)	Returns a value of the day for a specific date. The serial_number argument is a date value (or reference to one). Example: DAY("15/3/2005") equals 15.
HOUR	=HOUR (serial_ number)	Returns hour value for a specific time. The hour is given as an integer, ranging from 0 (12:00 A.M.) to 23 (11:00 P.M.). The serial_number argument is a time value (or reference to one). Uses a 24-hour time format. Example: HOUR("12:15:45") equals 12.
MINUTE	=MINUTE (serial_ number)	Returns the minute value for a specific time. The serial_number argument is a time value (or reference to one). Uses a 24-hour time format. Example: MINUTE("12:15:45") equals 15.
SECOND	=SECOND (serial_ number)	Returns a value of a second for a specific time. The serial_number argument is a time value (or reference to one). Uses a 24-hour time format. Example: SECOND("12:15:45") equals 45.
DAYS360	=DAYS360(start_ date,end_ date)	Returns the number of days between two dates based on a 360-day year (twelve 30-day months), which is used in some accounting calculations. Example: DAYS360("30/1/05", "1/2/05") equals 1

Statistical Functions

Excel offers a large number of functions to help you analyze statistical data. If they're not enough you can also use the *Analysis Toolpak* which, if installed, is found under **Tools** → **Data Analysis**. If you cannot find it here, select **Tools** → **Add Ins**, select the *Analysis Toolpak* check box and click **OK**. If you are told *Analysis Toolpak* is not yet installed, click **Yes** to install it.

Function	Syntax	Description
AVERAGE	=AVERAGE(number1, number2...)	Calculates the average, or arithmetic mean, of the numbers in the range or arguments.
COUNT	=COUNT(value1, value2...)	Counts the number of cells that contain numbers, including dates and formulas. Ignores all blank cells and cells that contain text or errors.
COUNTA	=COUNTA(value1, value2...)	Counts the number of all nonblank cells, regardless of what they contain.
COUNTIF	=COUNTIF(range, criteria, sum_range)	Counts the cells only if they meet the specified criteria. Similar to SUMIF.
MAX	=MAX(number1, number2...)	Returns the largest value in a range.
MEDIAN	=MEDIAN(number1, number2...)	Calculates the median of the numbers in the range or arguments. The median is the number in the middle of a set of numbers—half the numbers have values that are greater than the median, and half have values that are less.
MIN	=MIN(number1, number2...)	Returns the smallest value in a range.
MODE	=MODE(number1, number2...)	Determines which value occurs most frequently in a set of numbers.
STDEV	=STDEV(number1, number2...)	Estimates standard deviation based on a sample. The standard deviation is a measure of how widely values are dispersed from the average value.
STDEVP	=STDEVP(number1, number2...)	Estimates standard deviation based on an entire population.
SUMIF	=SUMIF(range,criteria, sum_range)	Adds the cells only if they meet the specified criteria. Example: You want to total the cell range B1:B5 only if the value in cell A1 is greater than 500. SUMIF(A1,"> 500",B1:B5)
VAR	=VAR(number1, number2...)	Estimates variance based on a sample.
VARP	=VARP(number1, number2...)	Estimates variance based on an entire population.

Database Functions

Database functions return results based on filtered criteria. All the database functions use the same basic syntax =Function(*database, field, criteria*). The arguments include:

- **Database:** The cell range that makes up the list or database.
- **Field:** Indicates which column is used in the function. You can refer to fields by their column label enclosed with double quotation marks, such as "Name" or as a number that represents the position of the column in the list: 1 for the first column, 2 for the second, and so on—not the column heading numbers!
- **Criteria:** Is a reference to the cell or cell range that specifies the criteria for the function. For example, you might only want to total records from a certain region.

Function	Syntax	Description
DAVERAGE	=DAVERAGE(database, field, criteria)	Find the average of values in a column in a list or database that match the criteria you specify.
DCOUNT	=DCOUNT(database, field, criteria)	Counts the number of cells that contain numbers from a list or database that match the criteria you specify.
DGET	=DGET(database, field, criteria)	Extracts a single record from a database that matches the criteria you specify.
DMAX	=DMAX(database, field, criteria)	Returns the largest value from a database that matches the criteria you specify.
DMIN	=DMIN(database, field, criteria)	Returns the smallest value from a database that matches the criteria you specify.
DSTDEV	=DSTDEV(database, field, criteria)	Estimates standard deviation based on a sample. The standard deviation is a measure of how widely values are dispersed from the average value.
DSTDEVP	=DSTDEVP(database, field, criteria)	Estimates standard deviation based on an entire population. The standard deviation is a measure of how widely values are dispersed from the average value.
DSUM	=DSUM(database, field, criteria)	Adds the values in a column in a list or database that match the criteria you specify.
DVAR	=DVAR(database, field, criteria)	Estimates variance based on a sample from selected lists or database entries.

Chapter One Review

Tutorial Summary

Formulas with Several Operators and Cell Ranges

- If you combine several operators in a single formula, Microsoft Excel performs the operations in this order: (), :, %, ^, * and /, + and -, = <> <= >=.
- Change the order of precedence by enclosing in parentheses the part of the formula you want to calculate first.

Using Insert Function to Enter and Edit Formulas

- The Insert Function tool assists you in selecting, entering, and editing worksheet functions.
- **To Use the Insert Function tool to Enter or Edit a Formula:** Select the cell where you want to enter or edit a formula and click the **Insert Function button** on the Formula bar.

Creating and Using Range Names

- You can create a range name by selecting a cell range and then giving it a name in the **Name box** in the Formula bar.
- You can refer to names in your formulas. For example, =SUM(Expenses) instead of =SUM(B3:B35). You can also refer to column and row headings in your formulas.
- **To Automatically Create Names:** Select the cell or cell range you want to name and select **Insert** → **Name** → **Create** from the menu. Change the check boxes in the Create Names dialog box and click **OK**.
- **To Change the Cell Reference of a Name:** Select the new cell or cell range you want to use as the reference and Select **Insert** → **Name** → **Apply** from the menu. Select the name you want to use in the selected reference and click **OK**.

Selecting Nonadjacent Ranges and Using AutoCalculate

- Select cell ranges that aren't next to each other by selecting the first range, and pressing and holding the <Ctrl> key while you select additional cells.
- The Status bar displays the total (or other selected calculation) of the selected cell range.
- **To Change the AutoCalculate Function:** Right-click the AutoCalculate area of the Status bar and select the function you want AutoCalculate to use from the shortcut menu.

Using the IF Function to Create Conditional Formulas

- The IF function evaluates a condition you specify and returns one value if the condition is true and another value if the condition is false.
- The syntax for the IF function is =IF(logical_test,value_if_true,value_if_false). It's much easier to create IF formulas using the Insert Function tool.

Using the PMT Function

- The PMT function calculates the payment for a loan based on periodic payments and a constant interest rate.
- The syntax for the PMT function is =PMT(rate,nper,pv). It's much easier to create PMT formulas using the Insert Function tool.

Fixing Errors in Your Formulas

- Be able to identify and correct any error values.
- The Formula Auditing toolbar helps track the cause of an error. Display it by selecting **Tools** → **Formula Auditing** → **Show Formula Auditing Toolbar**.

Displaying and Printing Formulas

- **To Display or Hide Worksheet Formulas:** Select **Tools** → **Options** from the menu and click the **View tab** and check or uncheck the **Formulas check box**.

Review Exercise

1. Excel always calculates formulas from left to right. (True or False?)
2. Which of the following formulas will Excel NOT be able to calculate? (Trick Question!)
 - A. =SUM(A1:A5)-10
 - B. =SUM(Sales)-A3
 - C. =SUM(A1:A5)/(10-10)
 - D. =SUM(A1:A5)*.5
3. Which of the following statements is NOT true?
 - A. The Insert Function button on the Formula bar helps you select, enter, and edit formulas.
 - B. Range names can contain up to 255 characters, including spaces.
 - C. You can create a range name by selecting a cell range and entering the range name in the Name box in the Formula bar.
 - D. You can refer to range names when you reference cells in your formulas.
4. Which of the following statements is NOT true?
 - A. You can select cell ranges that aren't next to each other by selecting the first cell range, pressing and holding the <Ctrl> key and selecting any additional cell ranges.
 - B. =IF(A4 >10, 0.5, 0) is a example of a properly entered formula using the IF function.
 - C. If the Insert Function tool obscures the cells you want to reference in a formula you can click the Collapse Dialog box to temporarily shrink the Insert Function tool.
 - D. Excel displays the error value "#####" when it doesn't recognize the text you've entered into a formula.
5. Which is the fastest method to find the total of a cell range?
 - A. Select a blank cell, click the AutoSum button on the Standard toolbar, select the cell range and click <Enter>.
 - B. Select a blank cell, type "=SUM", select the cell range, type ")" and click <Enter>.
 - C. Select the cell range and the status bar will display its total.
 - D. Select the cell range, click the AutoSum button, and the Name box in the Formula bar will display the total.
6. What does the error #DIV/0! mean?

- A. That a number value is too wide to display within the cell.
 - B. That a formula is divided by zero or an empty cell.
 - C. That a formula is divided by the letter O.
 - D. That you won't be receiving any stock dividends this year.
7. **You are thinking about buying a £250,000 house. What function can help you calculate your monthly payments?**
- A. SUM.
 - B. IF.
 - C. PMT.
 - D. COUNT.
8. **Which of the following statements is NOT true?**
- A. Range names can make it easier to reference cells. For example, instead of typing (A1:B10) you could refer to the same cell range by its name, Expenses.
 - B. You can create a range name by selecting a cell range and then entering its name in the Name box in the Formula bar.
 - C. You can't use range names in a formula.
 - D. You can use column and row labels in a worksheet to refer to data in formulas.
9. **Which of the following formulas would find the smallest number in the cell range B10 to E25?**
- A. =COUNT(B10:E25).
 - B. =MIN(B10:E25).
 - C. =FIND(B10:E25).
 - D. =SMALL(B10:E25).

Review Answers

- 1. **False.** If you combine several operators in a single formula, Microsoft Excel performs the operations in this order: (), :, %, ^, * and /, + and -, = <> <= >=.
- 2. **C.** The (10-10) portion of the formula would result in 0, causing the formula to divide by 0, which, if you remember your maths classes, is impossible (gives an infinitely large number).
- 3. **B.** Range names cannot have spaces in them.
- 4. **D.** The error value "#####" means a numeric value is too wide to display within the cell. You can resize the column by dragging the boundary between the column headings.
- 5. **C.** AutoCalculate automatically displays the total of any selected cells in the status bar and is the fastest and easiest method to find the total of a cell range.
- 6. **B.** #DIV/0! is the division by zero error.
- 7. **C.** The PMT function calculates the payment for a loan based on periodic payments and a constant interest rate.
- 8. **C.** You can use range names in a formula, for example =SUM(Income).
- 9. **B.** =MIN(B10:E25) would find the smallest number

MTC112 – Spreadsheets II – More number crunching

This assignment builds on an understanding of the learning covered within CertBOIS module MTC112.

For this assignment you will need to use the data file MTC112.csv that was included within the module download files. This file is a partial list of telephone calls made during February 2005.

Using Excel, open the MTC112.csv data file, and save the workbook in Excel format and with a filename MTC112T1.

1. Format the spreadsheet appropriately to make the worksheet user friendly.
2. In the spreadsheet include relevant formula to work out the average duration and cost of all the telephone calls.
3. Create a List which allows you to keep a check on the number, cost and average duration of calls made to different towns.
4. Create a custom AutoFilter, to select all calls made to Plymouth or Exeter telephone numbers, sorted in ascending order. Copy this information to a new worksheet – call it ‘PlymExe’ - within the same workbook.
5. Using all of the data within the original worksheet you need to establish whether the calls made are either ‘Local’ (calls made to Plymouth) or ‘Long Distance’ (all others calls). Create a new column, appropriately named, and write a relevant formula to enable the automatic labelling of each call as either Local or Long Distance.
6. You have been asked to supply details of costs and duration of long distance and local telephone calls. In Word, create a Memo document with appropriate memo header etc., and embed a column chart which summarises and compares the total cost and duration of Local and Long Distance calls.
7. Since calls to mobile and premium telephone numbers have been made from the office, you have decided to log all future calls as they are made. In the same workbook, create a new worksheet, allowing you to enter future call details as they are made. Ensure that your worksheet has the necessary data validation to display an alert when any call is made to a mobile or premium line telephone number (starting 07 or 09).
8. Using the worksheet created in Task 7, create a Macro that will allow you to enter all new call records into the worksheet using Input boxes.
9. Complete the End of Module Reflection form included within the MTC112 download files.

Your attention is drawn to the marking criteria for additional information on what to include in each task.

Sending in your work:

When you have completed the assignment, you will need to create two zipped files using WinZip or similar, to prevent e-mail systems from seeing them as 'potentially unsafe attachments'. The first should contain your Excel workbook and word document, the second should contain your End of Module Reflection form.

Send your compressed files as e-mail attachments to bois@moustraining.uk.com
The subject line should read: your surname, forename and MTC112-0306

Task 1 – Appropriate formatting of worksheet	5 marks
Task 2 – Formula applied	5 marks
Task 3 – Creation of check list	10 marks
Task 4 – Creation of AutoFilter	15 marks
Task 5 – Formula for Automatic labelling	15 marks
Task 6 – Memo with embedded chart	15 marks
Task 7 – New worksheet with data validation	15 marks
Task 8 – Macro allowing use of Input boxes	20 marks