Module 1: Introduction to Excel

Learning Goal for Module 1

At the end of this Module, students will have a basic understanding of Excel terminology, be able enter/delete/format data, create/name/delete sheets in a workbook, and understand how to reference cells across different sheets.

Specific skills for this Module:

- Understand the Ribbon Bar and the use of Tabs
- Know where to find special procedures for statistics, finance, and logical operations
- Create a simple formula
- Open a workbook, create sheets, and name sheet
- Label individual sheets
- Reference data in different sheets.

Note: This Module is basic to the course, but no test or exam will cover this information. It is like using a pen, without this knowledge your progress in the course will stall.

Caution (Obnoxious statement)

- Learning Excel is cumulative – it builds layer on layer and requires practice to acquire confidence.
- The more comfortable you are in Excel, the more productive you will be in work, and possibly more importantly on the tests/exams.
- All exams are "open- universe"
- You can consult anything (texts, your notes, on-line help…), but
- You cannot contact another person in anyway.
- The individual tests are "exponentially challenging"; it is not that hard to get a C, but getting an A is challenging and A+ marks are for students who present novel solutions.
- The exams do not test memory but the application of course material.
- Most important - start learning Excel right now, keep up throughout the course, setting aside several hours each week to acquire skill.
- Cramming the night before a test or trying to look up methods during the exam does not work.
- You will complete the tests and final exam in real time and remotely. Special security protocols ensure that you submit responses that reflect solely your work.

1. Course Philosophy

Excel is a powerful computational tool with many dimensions. It is easy to become overwhelmed when starting. This text proceeds slowly by making economics analytics the

skeleton and introducing Excel methods as needed and in the context of a specific problem in economic measurement or modelling.

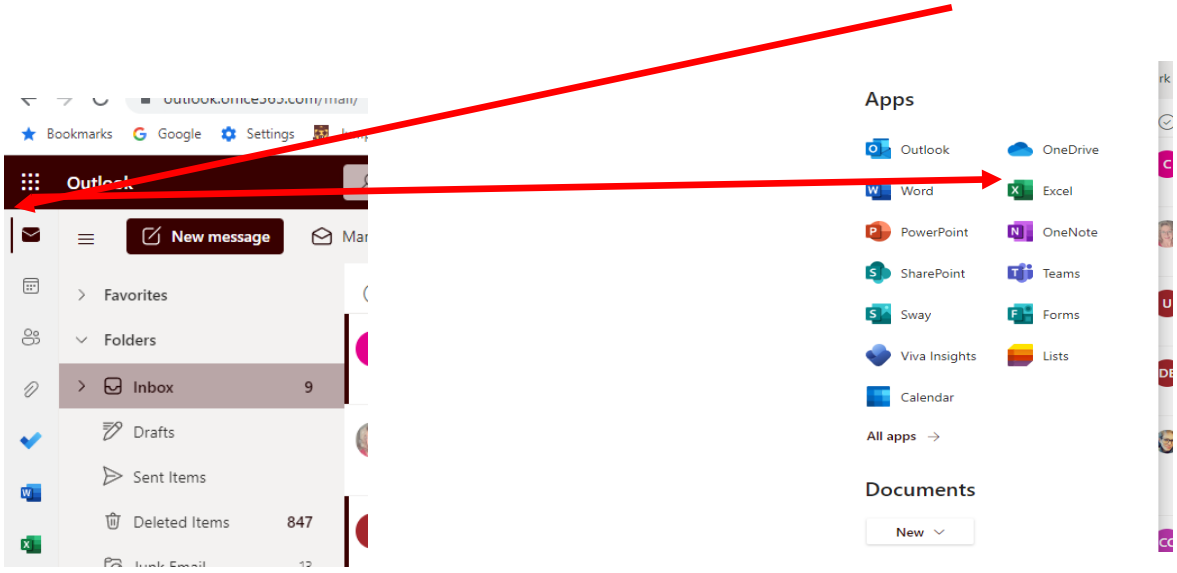
Since many ways exist to solve a problem in Excel, the text uses elementary methods and later as one's confidence grows, more advanced solution methods become available.

2. Introduction - What is Excel?

Excel was one of the very first apps (applications) created for the PC in the mid-eighties. Initially created to support accounting. It has evolved to support a wide range of scientific and technical research applications. Economics and business analytics use Excel in many ways:

- Organizing and sorting data
- Transforming data to reveal relationships within the data
- Statistical analysis
- Forecasting
- Calculating optimal resource allocation (linear programming and operations research)
- Simulating alternative futures.

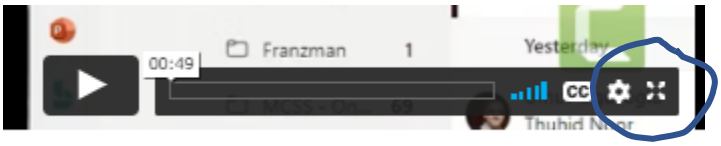
It also has basic word-processing capabilities, and as an element of the Office suite, it works seamlessly with Word, PowerPoint, and Access. Finally, Excel often has an important role in developing data for statistical programs such as STATA. In short, no professional economist can expect to function without a good command of Excel. **All students have access to Excel through their email accounts.**



2.1. Learning videos

• Learning videos appear as links with each module • These will guide you through many of the steps needed in Excel • PC users will have no trouble in playing these videos through Windows media player • Mac users may need to download VLC media player, from http://www.videolan.org/vlc/index.html • This is such versatile program; both Mac and PC users will benefit from downloading it. It will improve your Tik Tok experience. • It is free!	Green boxes denote videos – click on the name to go to the video link. Video: Excel Startup Note: An alternative source the videos are available through UMLearn.

Hints on watching the videos: Click on the link, and open the video to full screen



Once you have watched the video, click on ESC to exit *Vimeo,* and return to the document. Be careful; delaying may result in the next video playing which will likely be unrelated to the topic.

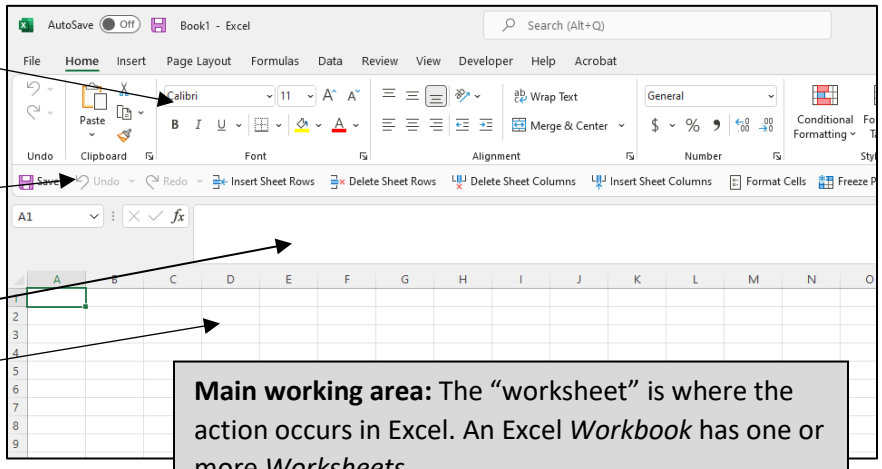
2.2. Opening Excel

Excel opens like any other Office program. Microsoft 365 presents the following screen at start-up.

Ribbon bar has drop down tabs to many procedures.

Quick access tool bar makes common actions routine.

Formula bar … you can write the formula here, or if you place the formula in a cell, it will mirror here. Use "=" as the first character to signal a formula.



Main working area: The "worksheet" is where the action occurs in Excel. An Excel *Workbook* has one or more *Worksheets*.

2.3. Ribbon Bar

Each tab on the Ribbon bar (except *File*) produces a drop down for a whole series of procedures grouped thematically. Watch the video and Experiment now by clicking each tab.

Video: Ribbon Bar

2.4. Quick Access Bar

Many tasks in Excel are repetitive. The Quick Assess Base allows the user to fine tune Excel to reduce the drudgery of data entry, formula creation, and managing large arrays of information. The Quick Access toolbar reflects the preferences of the user and the nature of the tasks at hand.

Video: Quick Access Bar

2.5. Formula Bar

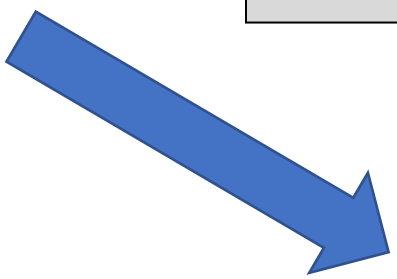
Video: Formulas 1

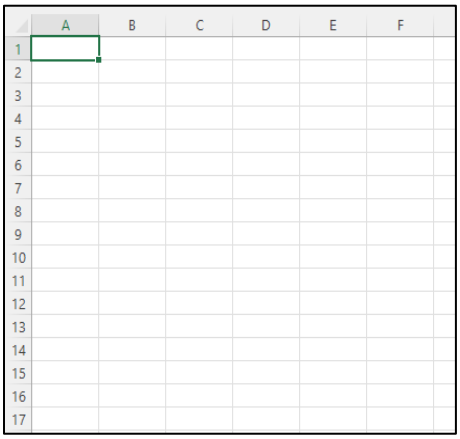
The core of Excel for this course is the set of formulas that support the creation of economic analysis. This includes the creation of demand and supply equations, calculating taxes, measuring inequality, estimating regression models, and showing how a pandemic evolves.

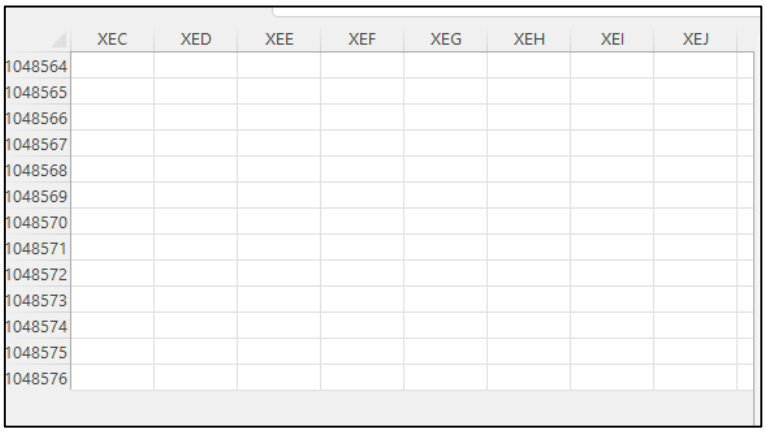
2.6. The Working Area

- Excel starts with a rectangular display, comprising cells numbered as rows and labelled as columns
- Each cell in Excel has a unique identifier such as A1, B22, TM3456.
- Excel has a maximum
  - 1,048,576 rows by
  - 16,384 columns labelled A, B, …. Z, AA, AB … AAA … XFD
  - 17,179,869,184 single digit numbers

Top left corner







Bottom right corner

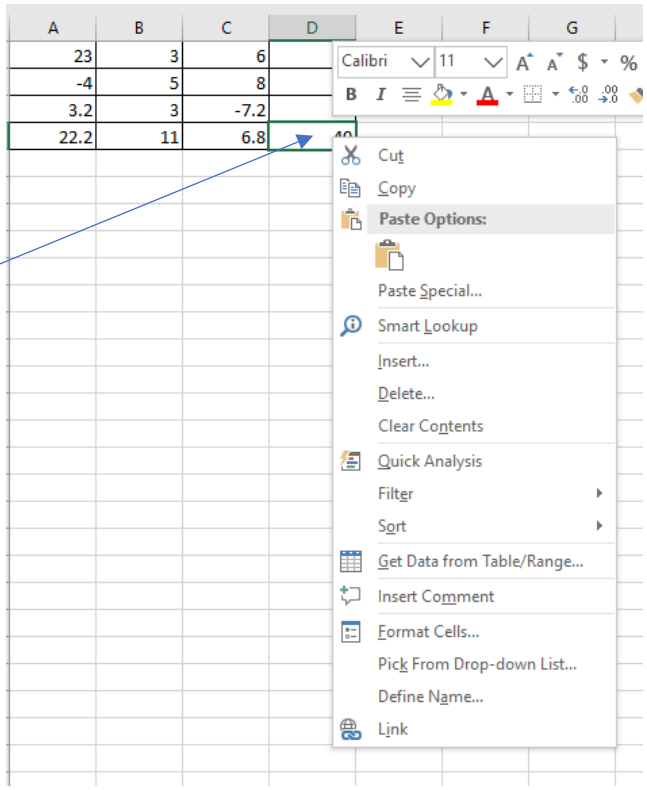
3. Formatting cells

Like Word you can format the appearance of cell entries, but Excel also allows you to change the format of numerical entries

A right click on the mouse in cell D4, produces a menu to change the appearance of cell contents and a menu to execute a whole number of actions such as:

- Insert/delete rows and columns (which is essentially to move roes up or down and columns right and left)
- Sort a row or column (Ascending/Descending)
- Insert a web link
- Format cells (Bold, Italics, Fonts…).

Video: Formatting Cells



4. Create a simple formula

We can calculate the total number of single digits that Excel Sheet can hold

- In A1 we enter 1048576 (the max number of rows)
- In B1 we enter 16384 (the max number of columns)
- In C1 we enter "=A1*B1"

Note that this formula also appears in the equation editor on the formula bar

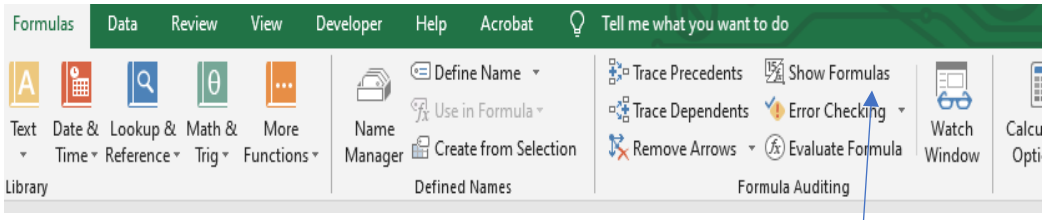
- Next, we click on the √, the formula disappears from C1 and is replaced by the results of the calculation (1048576)*(16384)
- The "="symbol signals that what follows is a formula. Try omitting and see what happens.
- The "√" performs the calculation.
- Also, you can press F9 on the keyboard to perform the calculation

Understanding absolute versus relative cell references will be essential for increasing your computational efficiency in Excel. Learning to enter formulas and perform calculations will start your journey to unlocking the power of Excel.

For example, Excel offers several functions for summing rows/columns/arrays of numbers. Here is an example:

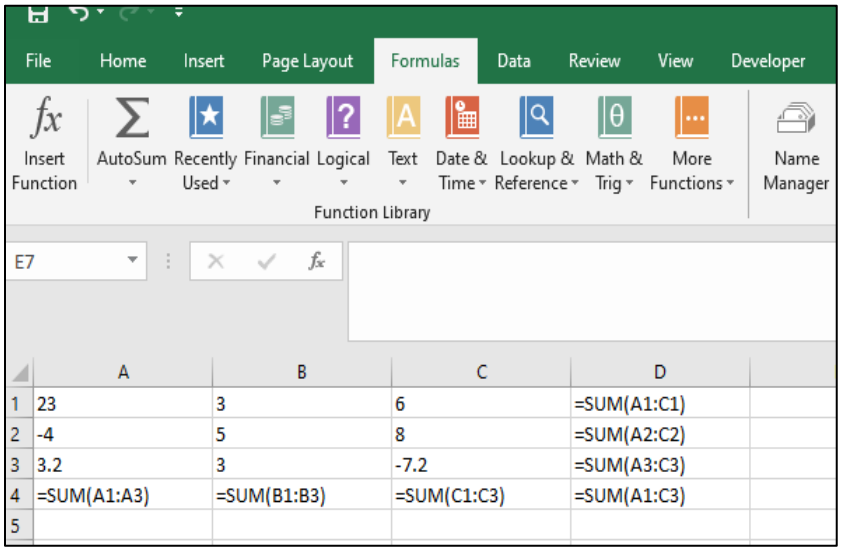
3	3	6	32
-4	5	8	9
3.2	3	-7.2	-1
22.2	11	6.8	40

23	3	6	=SUM(A1:C1)
-4	5	8	=SUM(A2:C2)
3.2	3	-7.2	=SUM(A3:C3)
=SUM(A1:A3)	=SUM(B1:B3)	=SUM(C1:C3)	=SUM(A1:C3)



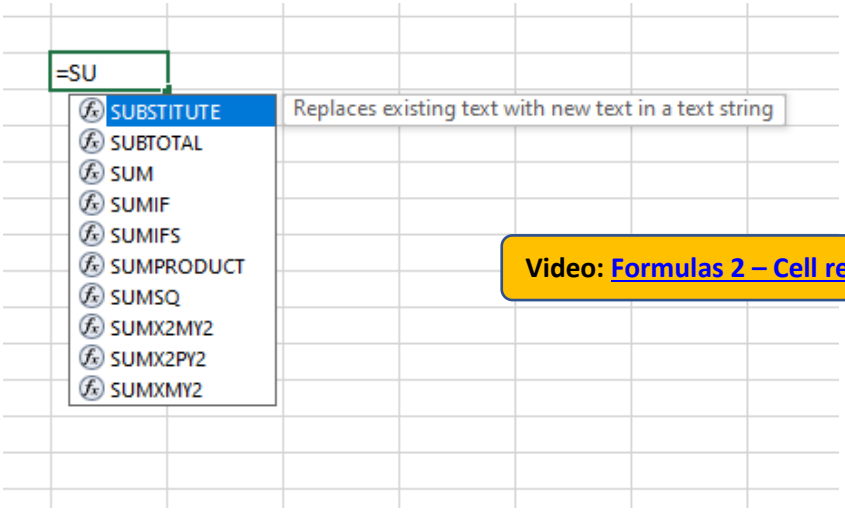
Debugging formulas can be difficult, but you can Show Formulas in the Formula tab.

Here is the table and formulas in Excel. Pay attention to the cell designations in brackets: A1:C1 defines a row; A1:A3 defines a column; and, A1:C3 defines the entire array.

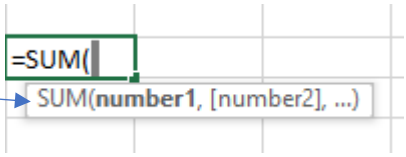


5. Summation

Entering the strong "=SU" in any cell will produce a drop down of all the functions that start with "SU." Most are summation of various types, but the first is not.



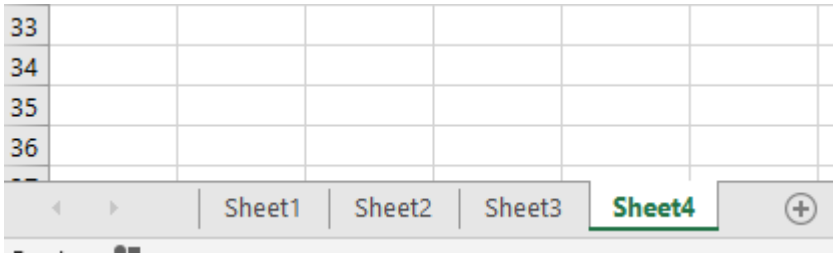
Video: Formulas 2 – Cell references

Double Click on the  to reveal the structure of the function 

Practice with the other =SU functions to learn what they do. Note an operator is a single transformation of a number or a set of numbers. Summing a set of numbers is an operation as it taking the logarithm of a number. A *function* is a "machine" that transforms an input variable (such as X) into an output variable. num A *formula* is an algebraic expression comprising a sequence of functions and constants joined by operators. An *equation* shows the equality between functions and formulas.

6. Workbook and Worksheets

When you first open Excel, the workbook has one sheet (Sheet 1). These are pages in a book. Clicking on  the adds



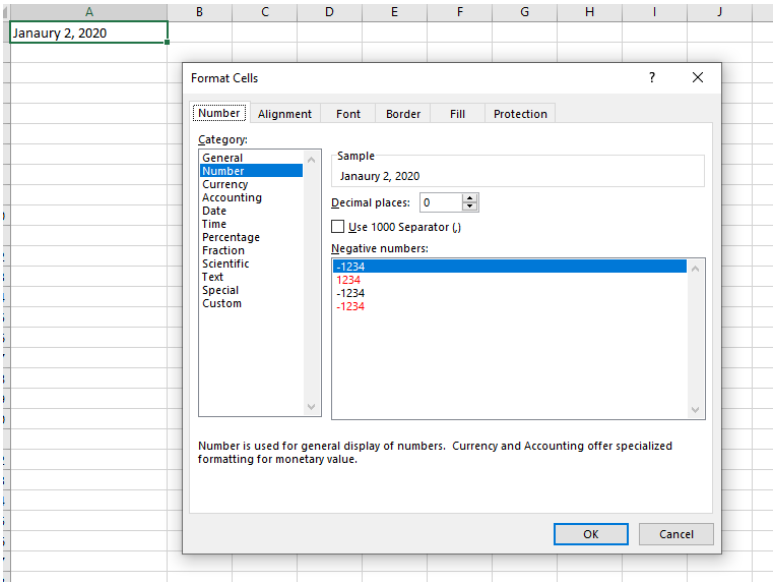
Sheet 2, and so on. You can rename sheets. You will use sheets in your tests an when we create more advanced models with dashboards, data, metadata, and model formulas.

Each sheet has a unique identification, which supports calculation across sheets. You will see this soon and it is easier to see it rather than explain it.

Video: Workbooks and Worksheets

7. Dates in Excel

Even though a cell entry may appear as a date, and many date formats exist, Excel always treats dates as the number of days since January 1, 1900



You can change this date – January 2, 2020 into many different formats. Numerical Dates are tricky and it is important to understand what convention underlies the date… US format is MM/DD/YYYY, while Canadian format is DD/MM/YYYY. If you enter January 2, 2020, right click, and convert this to an integer, you will see that 43832 days have elapsed since January 1, 1900 and January 2, 2020.

8. Quick navigation

Not all spreadsheets will be small; in fact, big data are becoming the norm in business and academic research. Learning how to move quickly around a big data set will increase your productivity and make your work less tiring. CTRL+? means pressing CTRL and the action denoted by ?

CTRL + an Arrow CTRL + → CTRL + ← CTRL + ↓ CTRL + ↑	Moves the cursor from the present position to the edge of the data, or if you are in an empty cell, it will move the cursor to the nearest cell with an entry
SHIFT + Arrow	Selects multiple cells
CTRL + Shift + Arrow	Selects a large range of cells
CTRL + Pg Up	Moves the next sheet to the right
CTRL + Pg Dn	Moves the next sheet to the left

Open the file Mincome Data under the Data tab for Module 1 in UMLearn and practice these moves. You will see the main data sheet, with two other sheets that include an overview of the data and a variable description. Module 2 will present more complex formulas and included exercises on these data.

9. Summary

Provided you have worked through the videos and copied the examples used, as well as tried things on your own, you should be more comfortable with the following tasks:

- Opening Excel
- Creating/renaming/deleting sheets
- Performing simple calculations and understanding that Excel often has several ways to accomplish the same tasks
- Performing calculations across sheets and understanding how Excel names variables across sheets
- Understanding the structure of Excel functions and formulas
- Moving quickly around large spreadsheets.

10. Key Excel functions, formulas, and procedures

A formula starts with = and directs Excel to place the result of the formula into the designated cell.
A function also starts with = but summarizes a complex formula.

Example: The formula "=A1+A2+A3+A4" and the function "=SUM(A1:A4)" do the same thing.

Basic mathematical operations		
Function	Explanation	Example
=SUM()	Addition of elements in a row, column or array	=SUM(A1:A4) sums the four numbers in column A1:A4
=A1+A2+A3+A4 =F12+G12+….M12+F13+G13+…M13…+F30+G30…+MA30	The formular counterpart to the =Sum() function This summation as 152 terms, clearly showing the advantage of the =SUM function	=SUM(F12:M30) sums all the elements in this array. How many elements exist? Answer 152