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# 1

# Introduction

*This chapter shows how the spreadsheet, the electronic counterpart of the paper ledger, has evolved in Excel, taking advantage of the various features of Microsoft Office, and the Windows operating system.*

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Ledger sheets pre-date computers and handheld calculators, and have been in use for literally hundreds of years.

# The Spreadsheet Concept

Spreadsheets, in the guise of the accountant's ledger sheet, have been in use for many, many years. They consisted of paper forms with a two-dimensional grid of rows and columns, often on extra-large paper, forming two pages of a ledger book, for example (hence the term "spread sheet"). They were typically used by accountants to prepare budget or financial statements. Each row would represent a different item, with each column showing the value or amount for that item over a given time period. For example, a forecast for a 30% margin (mark-up) and 10% growth might show:

Margin %	30				
Growth %	10				
			Profit Forecast		
	January	February	March	April	May
Cost of Goods	6,000	6,600	7,260	7,986	8,785
Sales	7,800	8,580	9,438	10,382	11,420
Profit	1,800	1,980	2,178	2,396	2,635
Total Profit	1,800	3,780	5,958	8,354	10,989

Any changes to the basic figures would mean that all the values would have to be recalculated and transcribed to another ledger sheet to show the effect; e.g. for a 20% margin and 60% growth:

Margin %	20				
Growth %	60				
			Profit Forecast		
	January	February	March	April	May
Cost of Goods	6,000	9,600	15,360	24,576	39,322
Sales	7,200	11,520	18,432	29,491	47,186
Profit	1,200	1,920	3,072	4,915	7,864
Total Profit	1,200	3,120	6,192	11,107	18,972



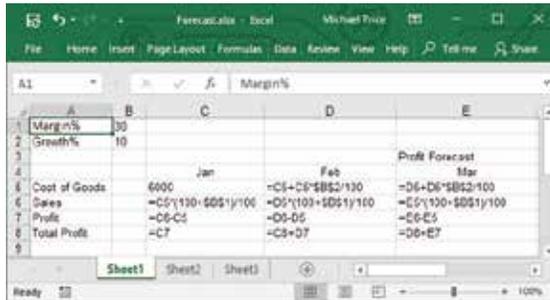
The first spreadsheet application was VisiCorp's VisiCalc (visible calculator). Numerous competitive programs appeared, but market leadership was taken first by Lotus 123, and now by Microsoft Excel.

To make another change – to show 10% margin and 200% growth, for example – would involve a completely new set of calculations. And, each time, there would be the possibility of a calculation or transcription error creeping in.

With the advent of the personal computer, a new approach became possible. Applications were developed to simulate the operation of the financial ledger sheet, but the boxes (known as cells) that formed the rows and columns could store text, numbers, or a calculation formula based on the contents of other cells. The spreadsheet looked the same, since it was the results that were displayed, rather than the formulas themselves. However, when the contents of a cell were changed in the spreadsheet, all the cells whose values depended on that changed cell would be automatically recalculated.

...cont'd

This new approach allowed a vast improvement in productivity for various activities, such as forecasting. In the second example shown on the previous page, you'd set up the initial spreadsheet using formulas, rather than calculating the individual cell values. A spreadsheet might contain these values and formulas, for example:



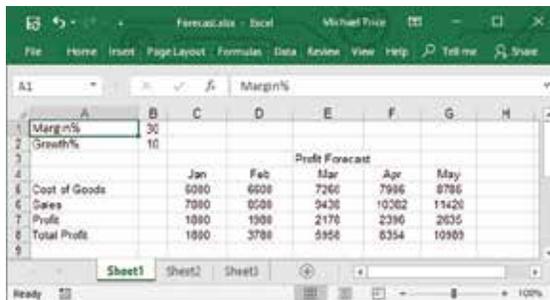
The screenshot shows an Excel spreadsheet with the following data and formulas:

	A	B	C	D	E
1	Margin%	30			
2	Growth%	10			
3			Jan	Feb	Profit Forecast
4					Mar
5	Cost of Goods	6000	=C5+C6*\$B5/100	=D5+D6*\$B5/100	=E5+E6*\$B5/100
6	Sales	=C5*(100+\$D5)/100	=D5*(100+\$D5)/100	=E5*(100+\$D5)/100	
7	Profit	=D6-C6	=D6-D6	=E6-E6	
8	Total Profit	=C7	=C8+D7	=E8+E7	



The = sign signals to Excel that what follows is a formula and must be calculated.

However, what will be displayed in the cells are the actual values that the formulas compute, based on the contents of the cells that the formulas refer to:



The screenshot shows the same Excel spreadsheet with calculated values:

	A	B	C	D	E	F	G	H
1	Margin%	30						
2	Growth%	10						
3			Jan	Feb	Profit Forecast	Apr	May	
4								
5	Cost of Goods		6080	6608	7260	7986	8786	
6	Sales		7080	8008	9430	10362	11420	
7	Profit		1000	1398	2170	2396	2635	
8	Total Profit		1000	3788	5958	6354	10903	



When you want to see the effect of changes – such as different values for margin and growth, for example – you change just those items and instantly see the effect, as the values calculated by the formulas are adjusted and redisplayed. The capabilities of the spreadsheet applications have evolved, and the use of spreadsheets has extended far beyond the original use for financial planning and reporting. They can now handle any activity that involves arrays of values interrelated by formulas; grading examination scores; interpreting experimental data; or keeping track of assets and inventories, for example. In fact, the newest spreadsheet applications seem to support just about any possible requirement that can be imagined.

Sets of predefined functions were added, plus support for writing small programs, or macros, to manipulate the data. Further developments incorporated graphs, images, and audio.



There are also versions of Excel designed specifically for the Apple Macintosh (“Mac”) computers – starting from Excel 1.0! Excel 2019 is available in versions for mobile devices that use iOS, such as the iPad and the iPhone. There are also versions for cell phones and tablets that are Android- or Windows-based.



The New icon pictured above indicates new or enhanced features introduced in Excel 2019.

# Microsoft Excel

VisiCalc and Lotus 123 were MS-DOS programs, subject to its command-line interface, but Microsoft Excel was developed for Windows. It was the first spreadsheet program to allow users to control the visual aspects of the spreadsheet (fonts, character attributes, and cell appearance). It introduced intelligent cell recomputation, where only cells dependent on the cell being modified are updated (previous spreadsheet programs recomputed everything all the time, or waited for a specific Recalc command). Later versions of Excel were shipped as part of the bundled Microsoft Office suite of applications, which included programs like Microsoft Word and Microsoft PowerPoint. Versions of Excel for Microsoft Windows and Office include:

1987	Excel 2.0	Windows
1990	Excel 3.0	Windows
1992	Excel 4.0	Windows
1993	Excel 5.0	Windows
1995	Excel 95 (v7.0)	Office 95
1997	Excel 97 (v8.0)	Office 97
1999	Excel 2000 (v9.0)	Office 2000
2001	Excel 2002 (v10)	Office XP
2003	Excel 2003 (v11)	Office 2003
2007	Excel 2007 (v12)	Office 2007
2010	Excel 2010 (v14)	Office 2010
2013	Excel 2013 (v15)	Office 2013 / Office 365
2015	Excel 2016 (v16)	Office 2016 / Office 365
2018	Excel 2019 (v18)	Office 2019 / Office 365

The newer versions of Excel provide many enhancements to the user interface, and incorporate connections with Microsoft Office and other applications. The basis of the program, however, remains the same. It still consists of a large array of cells, organized into rows and columns, containing data values or formulas with relative or absolute references to other cells. This means that many of the techniques included in this book will be applicable to whichever version of Excel you may be using, or even if you are using a spreadsheet from another family of products; though, of course, the specifics of the instructions may need to be adjusted.

# Microsoft Office 2019

Microsoft Office 2019 is the latest version of Microsoft Office, and it is available in a variety of editions, including:

- **Office Home & Student 2019 (PC & Mac)**
- **Office Home & Business 2019 (PC & Mac)**
- **Office Professional 2019**

There are volume licensing versions for larger organizations:

- **Office Standard 2019 (PC & Mac)**
- **Office Professional Plus 2019**

There is also a subscription version of Microsoft Office known as Office 365, and this is also available in a number of editions:

- **Office 365 Home (PC & Mac)**
- **Office 365 Personal (PC & Mac)**
- **Office 365 University**
- **Office 365 Business**
- **Office 365 Enterprise**

All of these editions include Microsoft Excel 2019. Whichever edition you obtain, your copy of Excel 2019 incorporates all the features and uses the Office result-oriented user interface, with the Ribbon, File tab, BackStage, Galleries, and Live Preview; etc.

Excel 2019 also uses the Microsoft Office file format, OpenXML, as the default file format. This is based on XML and uses ZIP compression, so the files will be up to 75% smaller than those in the older Microsoft Office file formats.

Other shared Office features include the Document Theme, which defines colors, fonts, and graphic effects for a spreadsheet or other Office document, and collaboration services for sharing spreadsheets and documents with other users.

## Office Online

Microsoft offers a free, web-based version of Office; this includes online versions of Word, Excel, PowerPoint, and OneNote. These online products feature user interfaces similar to the full desktop products, and allow you to access Office documents, including Excel spreadsheets, via your browser. They also make it easier for you to share documents with users who may not have Office 2019 on their systems. However, the Office Online apps do not support the full feature set of the desktop products.



The Office Online apps work in conjunction with OneDrive, the online storage associated with your Microsoft Account (or your Office 365 Account, if you have a subscription).



These are minimum requirements. You may need other components (e.g. a sound card) for some Excel features.



Office 2019 (32-bit) runs on both 32-bit and 64-bit systems. Microsoft recommends this, rather than the 64-bit version, for add-in compatibility.



This software only runs under Windows 2003, Vista, XP and 2000, and it only works with Office 2000, XP and 2003. If possible, save your Office 2019 documents in Office 97-2003 format for the older systems.

# System Requirements

To install and run Excel 2019, your computer should match or better the minimum hardware and operating system requirements for Office 2019. If you are upgrading to Office 2019, from Office 2010 or Office 2013, the hardware should already meet the requirements – though you may need to upgrade your operating system. For an upgrade from earlier versions of Office you will need to check that both hardware and operating system meet the minimum specifications for Office 2019. This includes:

<b>Operating system</b>	Windows 10 (32-bit or 64-bit) or Windows Server 2019 (64-bit)
<b>Processor</b>	1.6 GHz or higher (32-bit or 64-bit)
<b>Memory</b>	2 GB (32-bit) or 4 GB (64-bit)
<b>Hard disk</b>	4 GB of available disk space
<b>Monitor</b>	1280 x 768 resolution or higher
<b>Internet</b>	Broadband connection recommended for download, product activation and OneDrive



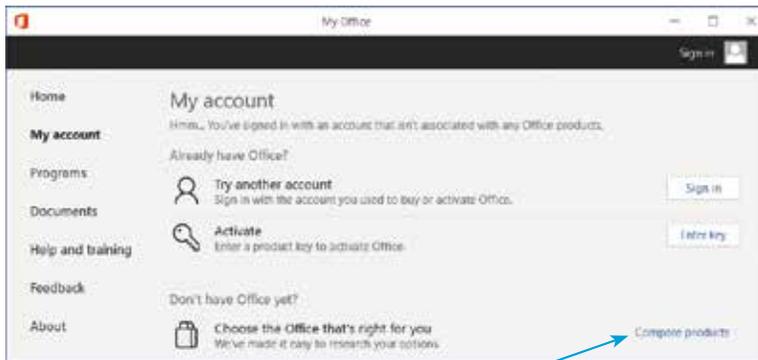
## Microsoft Office Compatibility Pack

This allows a computer running an older version of Office (2000, XP or 2003) to work with documents in the format used by later versions, including Office 2019. Microsoft no longer provides this software, but you can download a copy from [www.softpedia.com](http://www.softpedia.com). This will allow older versions of Excel to read the new file format.

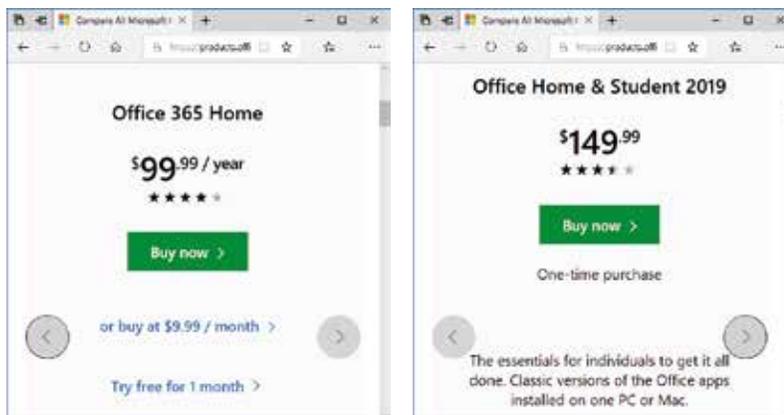
# Getting Office 2019

You can buy your preferred version of Microsoft Office 2019 in disk format from a retail source, or download it from Microsoft. Windows 10 provides the “Get Office” app, which checks the status of Office on your machine and, if it isn’t currently installed, helps you to obtain a copy.

- 1 Click the **Get Office** Start Menu tile or All Apps entry to review the status of Office on your system



- 2 Choose **Compare products** to view the options that are available; for example, Office 365 Home (Subscription) or Office Home & Student 2019 (One-time purchase)



- 3 Choose your preference and follow the prompts to buy and download the selected version



If you have been given a product key for Office, select Enter key and follow the prompts to download your copy.



Microsoft is keen to encourage adoption of the subscription versions – Office 365 Personal edition offers a free trial and also includes 60 minutes per month of Skype calls to cell phones and landlines.



Right-click Excel on the **All apps** list and select **Pin to Start** to add the Excel tile.



Right-click Excel on the **All apps** list, click **More** and click **Pin to taskbar** to add the Excel icon.



To always display the Search box, right-click the Taskbar and select Cortana, Show search box.



# Excel 2019 and Windows 10

With Microsoft Office 2019 installed under Windows 10, you have a number of ways to launch Excel 2019:

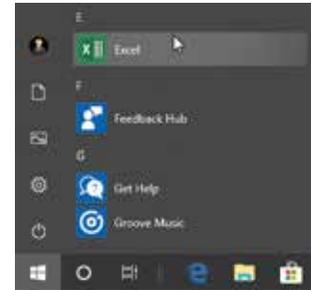
- 1 Your installation of Office may have added icons for Office applications on the Windows Desktop Taskbar. Click the green X icon to launch Excel 2019



- 2 Alternatively, you may find tiles for the Office applications on the Start screen. Click the Excel tile



- 3 If icons or tiles aren't shown, select **Start** and scroll the **All Apps** list to the **E** category and click the **Excel** entry

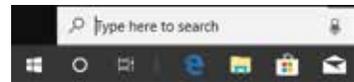


You can also look for applications by name, using the Windows 10 Search feature icon:

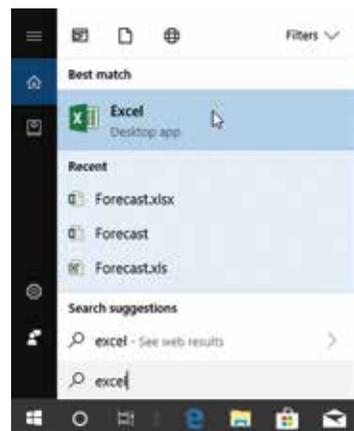
- 1 Click the **Cortana** icon on the Taskbar to display the **Search box**



- 2 Click in the **Search box** and type "excel" to find matching items



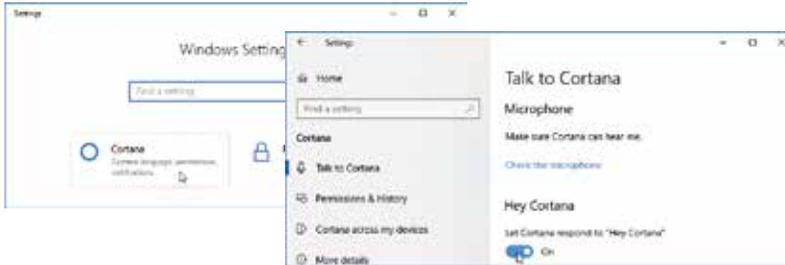
- 3 Select the **Excel** desktop app entry in the search results to launch the application



...cont'd

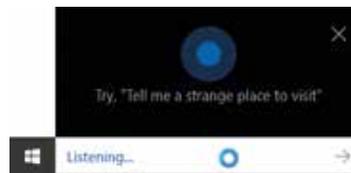
If you have a microphone on your system, you can use Cortana to simply ask to start applications. To check the status of Cortana:

- 1 Click **Settings**, select **Cortana**, click **Talk to Cortana**, and ensure that Cortana is set to respond to voice commands

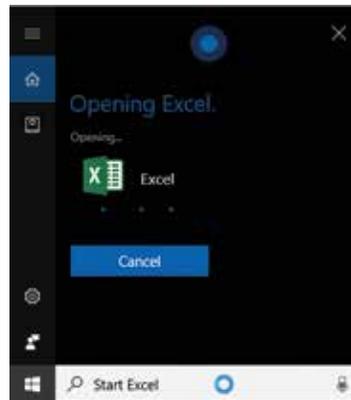


If Cortana can't hear you, or you can't hear Cortana, then click **Check the microphone** to have speech and audio settings updated.

- 2 Say "Hey Cortana" into your system microphone to wake up your Personal Digital Assistant



- 3 Now, say "start Excel" into the microphone to launch the Excel 2019 application



Cortana is new in Windows 10 but performance may vary by region. If Cortana is not working or enabled in your country try setting your region to "United States" in **Settings** > **Time & language** > **Region & language**.

Whichever of these techniques you use, the Excel 2019 application will be loaded and made ready to deal with your requirements.



# The Office 2019 Ribbon

The menus and toolbars used in earlier versions of Excel have been replaced by the Ribbon. With this, commands are organized in logical groups, under command tabs – **Home, Insert, Page Layout, Formulas, Data, Review, View** and **Help** tabs – arranged in the order in which tasks are normally performed. When you click any of these tabs, the corresponding commands display in the Ribbon.



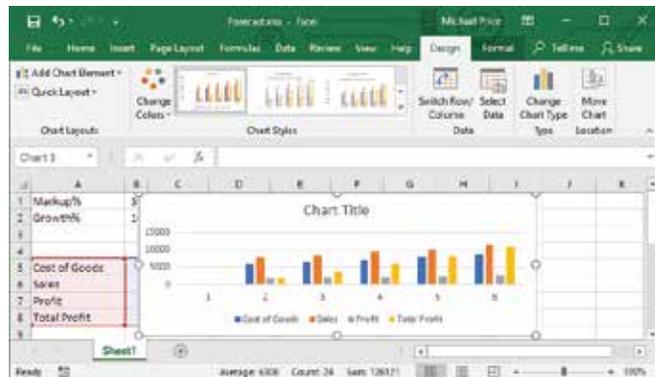
Other Office 2019 apps (Word, Access, Outlook, and PowerPoint) also have a Ribbon, which displays tabs appropriate to that particular app.



The **File** tab displays the BackStage view, which provides general document file functions, plus other functions such as **Share, Export** and the **Excel Options**.



The Ribbon may also include contextual command tabs, which appear when you perform a specific task. For example, if you select some data and then click **Insert Column Chart** in the **Charts** group, chart tool tabs **Design** and **Format** are displayed.

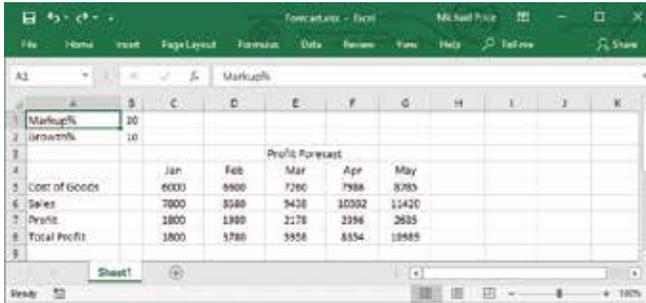


You can minimize the Ribbon, to use more of the space on the screen for the actual content of the spreadsheet:

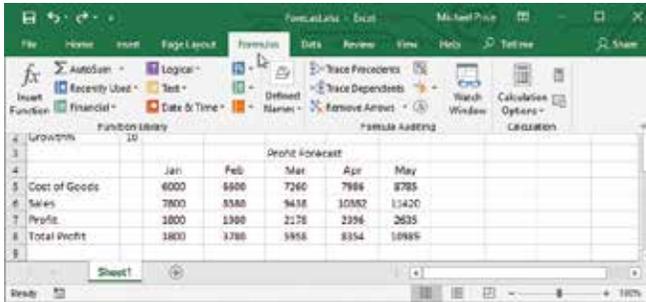
- 1 Click the **Ribbon Display Options** button and select **Show Tabs**
- 2 The tabs will still be displayed but the commands will be hidden



...cont'd



- The Ribbon and the commands are redisplayed as a temporary overlay whenever you click a tab, or when you use the **Alt** key shortcuts (see page 118)



### Touch/Mouse Mode

To enable Touch Mode:

- Click the Down arrow on the Quick Access Toolbar, then choose the **Touch** option
- The Ribbon displays with extra spacing between buttons



You can also choose **Auto-hide Ribbon**. Excel runs full-screen, with no tabs or commands visible. Click the top of the application to display the Ribbon.



Office 2019 applications offer two interfaces – Mouse or Touch, where the latter is optimized for operation with touch-enabled devices. To add this option to the Quick Access Toolbar, click the Down arrow and select **Touch/Mouse Mode**.





Explore the Ribbon tabs and command groups in Excel 2019 to find the features that you need to carry out activities on your worksheets.



There is a **Tell Me** text box on the Excel 2019 Ribbon where you can enter words and phrases, to quickly locate features or get help on what you want to do.

# Exploring Excel 2019

If you are used to a previous version of Excel, you may not always know where to find the features you need. The following table lists some of the actions that you may want to carry out, and indicates the Ribbon tabs and groups where the associated commands for these actions may be found in Excel 2019:

Action	Tab	Groups
Create, open, save, print, share, or export files; or change options	<b>File</b>	Backstage Commands – Info, New, Open, Save, Save As, Print, Share, Export, Close, Account, Options, and Feedback
Format, insert, delete, edit or find data in cells, columns, and rows	<b>Home</b>	Number, Styles, Cells, and Editing groups
Create tables, charts, sparklines, reports, slicers, and hyperlinks	<b>Insert</b>	Tables, Charts, Sparklines, Filters, and Links groups
Set page margins, page breaks, print areas, or sheet options	<b>Page Layout</b>	Page Setup, Scale to Fit, and Sheet Options groups
Find functions, define names, or troubleshoot formulas	<b>Formulas</b>	Function Library, Defined Names, and Formula Auditing groups
Import or connect to data, sort and filter data, validate data, flash fill values, or perform a what-if analysis	<b>Data</b>	Get External Data, Connections, Sort & Filter, and Data Tools groups
Check spelling, review and revise, and protect a sheet or workbook	<b>Review</b>	Proofing, Comments, and Changes groups
Change workbook views, arrange windows, freeze panes, and record macros	<b>View</b>	Workbook Views, Window, and Macros groups

If you want to locate a particular command, you can search the list of all of the commands that are available in Excel 2019 (see next page).

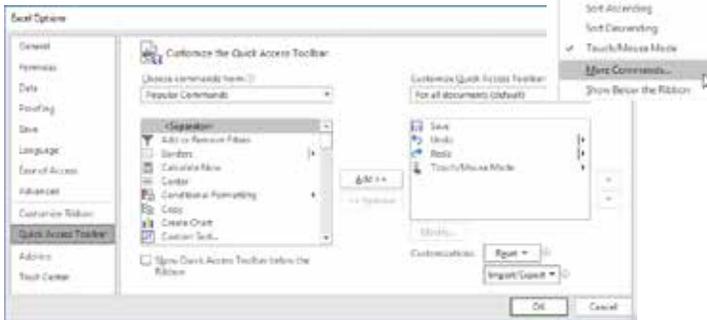
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To display the list of available commands:

- 1 Click the Down arrow on the Quick Access Toolbar to display its **Customize** menu (see page 17) and select the option for **More Commands**



You can also right-click the Ribbon and select **Customize the Ribbon...** to display the list of commands and view the associated ScreenTips.



- 2 Click the box **Choose commands from,** and select **All Commands**



- 3 Scroll the list and move the mouse pointer over a command name, and the ScreenTip will indicate the tab and group containing that command
- 4 Some of the commands may not currently be included in any group, and so will be shown with just their name – for example, the Calculator command:



To list the commands that may not be currently in any group you'd select **Commands Not in the Ribbon**. You can use Customize to **Add** any of these commands to the Quick Access Toolbar or to the Ribbon.



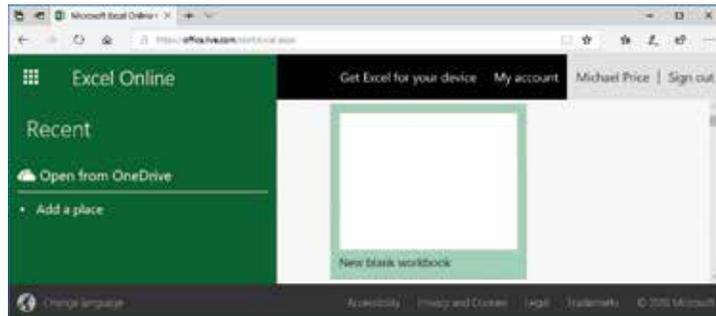
Office Online apps are touch-friendly web applications that let you create, edit and share Excel, Word, PowerPoint and OneNote files from any browser. They are free to use and can share your OneDrive storage.

# Excel Online App

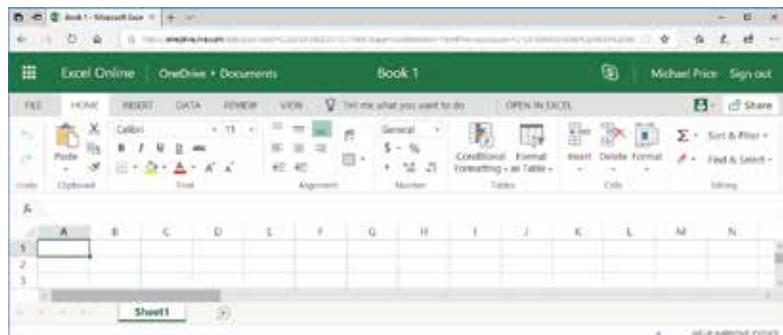
- 1 To use the free Office Online apps, open your web browser, sign in to your Microsoft account and go to the website address **products.office.com/en-us/office-online**



- 2 Select one of the Office Online app; for example, **Excel**



- 3 Select the **New blank workbook** to begin working on a new spreadsheet



OPEN IN EXCEL



If the function you want is not provided in the Excel Online app, select **Open in Excel** to use the full desktop version, where you have Office 2019 installed.