Ministry of 3ublic ealth of Ukraine
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at the meeting of the Department
of Medical Informatics, Medical Biophysics
DXJXVW
Minutes DXJXVW
Head of department BBBBBBBBBB296LONRYD

METHODICAL GUIDANCE

IRUVWXGHQWV for independent work when preparing and during the practical session

Academic Subject	Medical Information Science
Module No 1	Fundamentals of Information Technology in the Health Care System. Treatment and analysis of medical and biological data
Topic	Excel spreadsheets
Year of study	2
6SHFLDOLW\	Foreign Student Training (0HGFLQH6WRPDWRORJ\
Number of academic hours	2

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1. **Relevance of the topic**:

Medical researchers are impossible without gathering, ordering and statistical analysis of large volumes of various information about healthy peoples living in different condition and following the different life modes, about sick persons, and reactions of bodies on different therapeutically influences. Spreadsheets give an opportunity to accumulate and prepare data in tabular form, to produce preliminary calculation by easy way. Corresponding knowledge's are necessary for future doctors for comprehension of their professional tasks and possibilities.

2. **The specific aims**:

To have general knowledge of the topic studied;
To understand, to remember and to use the knowledge received;
To form the professional experience by reviewing, training and authorizing it;
To be able to carry out laboratory and experimental work.
To be able to prepare data tables, and to carry out simplest calculations using MS Excel.
Explain how to create and edit file with Microsoft Excel using.
To study fundamentals and methods of work with the data, methods of their processing.
To know how to copy, move, delete the data; to process data with the help the formula wizards; to submit data with the help of graphs and charts.

3. **Basic knowledge and skills necessary to study the topic (inter-disciplinary integration).**

Previous (providing disciplines)	**Obtainable skills**
Bases of computer sciences	To know assignment of computer programs.
Subsequent disciplines:	
Social medicine	To know assignment, basic features, using methods of spreadsheets.

4. **The tasks for students' individual work**

4.1. The list of basic term, parameters, characteristics, which student should master while preparin for the class.

Term	Definition
Worksheet	The primary document that you use in Excel to store and work with data. Also called a spreadsheet. A worksheet consists of cells that are organized into columns and rows; a worksheet is always stored in a workbook.
Cell reference	Cell reference or address is the combination of column letter and row number. Cell reference is the set of coordinates that a cell occupies on a worksheet. For example, the reference of the cell that appears at the intersection of column B and row 3 is B3.
Range	Two or more cells on a sheet. The cells in a range can be adjacent or nonadjacent
Drop-down list	Dop-down list box: A control on a menu, toolbar, or dialog box that displays a list of options when you click the small arrow next to the list box.
Formula bar	A bar at the top of the Excel window that you use to enter or edit values or formulas in cells or charts. Displays the constant value or formula stored in the active cell
Formula	A sequence of values, cell references, names, functions, or operators in a cell that together produce a new value. A formula always begins with an equal sign (=).
Name	A word or string of characters in Excel that represents a cell, range of cells, formula, or constant value.
Name box	Box at left end of the formula bar that identifies the selected cell, chart item,

	or drawing object. To name a cell or range, type the name in the Name box and press ENTER. To move to and select a named cell, click its name in the Name box
Function	It is a prewritten formula that takes a value or values, performs an operation, and returns a value or values. Use functions to simplify and shorten formulas on a worksheet, especially those that perform lengthy or complex calculations.
Argument	The values that a function uses to perform operations or calculations. The type of argument a function uses is specific to the function. Common arguments that are used within functions include numbers, text, cell references, and names.
Operator	It is a sign or symbol that specifies the type of calculation to perform within an expression. There are mathematical, comparison, logical, and reference operators.
Constant	It is a value that is not calculated and, therefore, does not change. For example, the number 210, and the text "Quarterly Earnings" are constants. An expression, or a value resulting from an expression, is not a constant.

4.2 Theoretical questions for the class (to the topic):

1. What programs name as spreadsheets? What are their functions?
2. How can you start Microsoft Excel?
3. What assignment units of the window have?
4. What are methods of selection of the command on the menu?
5. What assignments have basic elements of sheet windows?
6. What types of sheets exist in Excel?
7. What main operations can be fulfilled above sheets?
8. How files of books are formed and saved?
9. What name as the formula and an operand in an Excel?
10. For what the wizard of functions is intended? How to work with it?
11. Define concept the chart. For what it is intended?
12. How to work with the chart wizard?

4.3 Practical tasks pertaining to the topic and to be completed during the class:

Test

1. WHAT IS THE NAMEOF CELLS WHICH ADDRESSDOES NOT CHANGE WHEN COPYING FORMULAS?

a) standard
b) relative
c) absolute
d) final
e) are open

2. WHAT IS THE STANDARD NAME EXTENSIONS FILE CREATED BY EXCEL?

a) “.xls”
b) “.txt”
c) “.xlc”
d) “.doc”
e) “.docx”

3. WHAT IS THE RANGE LISTED IS CALLED?

a) all other cell line

b) All cell one column
c) set of allowable values
d) one cell
e) a set of cells that form a rectangular table area

4. WHICH OF THE OPTIONS INCLUDES THE CORRECT ADDRESS OF THE CELL?

a) 123S
b) SS12
c) V1A
d) D2A55
e) A12S

5. AS INDICATED BY THE OPERATOR ASSOCIATION THAT BRINGS TOGETHER MULTIPLE LINKS IN ONE?

a) ":" (Colon)
b) "$" (Dollar sign)
c) ";" (semicolon)
d) gap
e) "=" (Equals)

Practical work:

Task 2

Create prototype of form (register) of buy in accordance with a sample.

Calculation of goods cost

#	Goods	Unit	Price, $	Quantity	Price with value added tax, $	Cost
1	Hydrogen peroxide 3% 100 ml	vial	0,30	1500		
2	Potassium permanganat 5 g	piece	1,25	720		
3	Brilliant green alcoholic solution 1% 15 g	vial	2,20	40		
4	Iodine alcoholic solution 5%	vial	2,05	350		
5	Gauze medical bandage 7cm×10m	piece	0,42	7500		
6	Vishnevsky ointment 30 g	tube	3,51	35		
				Total cost, $		
				Discount, %		
				Final cost, $		

Include formulas of calculation of price with value added tax (120% of price), cost, total cost and final cost with discount into blank.

Discount conditions:

a) total cost less than 1000$ without discount, from 1000$ less than 5000$ discount is 5% of cost, from 5000$ discount is 10% of cost. Use function IF

Task 3

In the table the data on an amount of born children in the Poltava city for researched period are represented. Determine average indices of birthrate and rates of increase of an average indice. Construct the chart.

	Month												Total
	January	February	March	April	May	June	July	August	September	October	November	December	
2014	178	165	123	112	113	116	119	114	113	115	133	156	
2015	167	145	126	112	115	114	117	118	112	117	124	167	
2016	175	154	124	115	116	118	118	115	121	121	134	174	
2017	124	164	131	116	112	114	117	117	118	131	136	164	
2018	134	145	126	116	114	115	113	119	119	132	143	187	

Content of the topic:

WHAT IS MICROSOFT EXCEL?

Microsoft Excel (also known as **MS Excel**) is one of the most popular spreadsheet computer programs on the market today. Microsoft Excel is used for everything from creating a basic personal budget to statistical analysis. It is part of the Microsoft Office family, a group of programs that also includes Microsoft Word and Microsoft PowerPoint, as well as other programs. Microsoft Excel is not a free program, however, Microsoft Excel 2010 is installed on all of the library's PCs and can be used free of charge. This course focuses solely on Microsoft Excel 2010 for the PC. Other versions of the software for the PC vary in their functionality. Further, Microsoft Excel for Mac computers is very different than Microsoft Excel for the PC. If you have Excel 2011 for Mac, you may notice some similarities between that and Excel 2010 for the PC. Users who are interested in free spreadsheet programs are encouraged to register for a free Gmail account, which will give you access to Google Drive, a Google application that allows you to create free text documents, spreadsheets, and presentations.

IMPORTANT MICROSOFT EXCEL TERMS

Worksheet – The term "worksheet" in Excel refers to the single page that you use to enter information in Excel. A worksheet, by default, is made up of cells to form the grid pattern on the page.

Workbook – The term "workbook" in Excel refers to the entire Excel document. A workbook can consist of one sheet or multiple sheets.

OPENING MICROSOFT EXCEL 2010

The Microsoft Excel icon looks like a green "X" on top of a white sheet of paper, as can be seen below. The icon may already exist in three different places on your machine.

1. If the icon appears in the Windows taskbar at the bottom of the screen, simply left-click on the icon to open the program.

2. If the icon appears on the desktop, double-click the icon to open the program.

3. If the icon is not in the taskbar or on the desktop, first click on the Windows icon  (the **Start Menu**)

→ Then, click on Programs.

→ Next, choose Microsoft Excel.

→ If you do not see Microsoft Excel, look for a folder called "Microsoft Office." You should find Excel within that folder.

THE TITLE BAR

The first thing you may notice once Microsoft Excel has been opened is a title bar across the top of the screen.

This contains the title of the workbook that is currently in use. When first opened, the default title is "Book1." This can be changed when you are ready to save the workbook for the first time.

To the far right of the workbook title you will see three other icons. The first icon is the **Minimize**

icon, the second icon is the **Restore Down** icon, and the third icon is the **Close** icon.

Minimize – Click this icon to "hide" the window by "storing" it behind the MS Excel icon in the bottom taskbar.

Restore Down – Click this icon to shrink the window to a smaller size.

Close – Click this icon to close the workbook.

PAGE VIEW, ZOOM, AND SHEETS

At the bottom of the screen you will see another bar that contains important features like **Page View**, **Zoom**, and **Sheets**.

Page View – The various page views offer you different ways to "see" your sheet.

Zoom – Drag the zoom bar left or right to make the page smaller or larger. You can also click on the "100%" to view and change other custom zoom options.

Sheets – Excel allows you to use multiple different worksheets all within one workbook (or file). By default, there are three sheets shown labeled **Sheet1**, **Sheet2**, and **Sheet3**.

→ To add new sheets, simply click on the page icon with the star to the right of **Sheet3**.

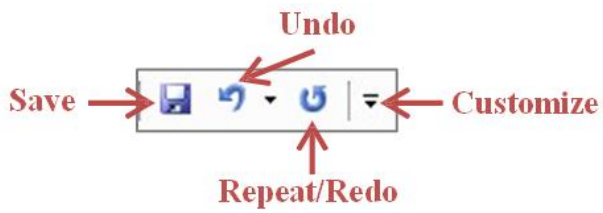
→ To rename a sheet, right-click on the sheet name and scroll down to **Rename**.

→ To delete a sheet, right-click on the sheet name and scroll down to **Delete**.

MENUS

QUICK ACCESS TOOLBAR

In the upper right-hand corner of the screen you will notice a small menu directly above the **File** tab. This is known as the **Quick Access Toolbar**. The **Quick Access Toolbar** enables you to add or remove various MS Excel functions to allow for quicker access to tools you may use frequently. By default, the **Quick Access Toolbar** includes the **Save**, **Undo,** and **Repeat** functions. You will also notice an upside down triangle next to the repeat button. This is the **Customize** function.



Save – This button will save a workbook.

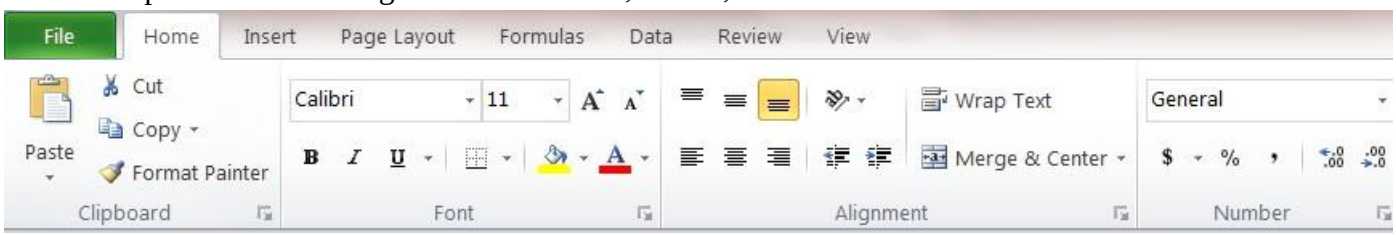
Undo – The undo button will undo the last operation that you have performed.

Repeat/Redo – The repeat button will repeat or redo the last operation that you have performed.

Customize – A drop-down list will appear when this button is clicked. This list contains more commands that you can add to the **Quick Access Toolbar**.

THE RIBBON

First introduced in the 2007 Microsoft Office software, the **Ribbon** menu marks one of the biggest changes from previous versions of Microsoft Office. The **Ribbon** menu houses all of the editing tools for MS Excel. The **Ribbon** consists of tabs which each contain their own sets of tools and options. By default, the **Ribbon** menu contains the **File, Insert, Page Layout, Formulas, Data, Review,** and **View** tabs. Important tabs for beginners are the **File**, **Home**, and **Insert** tabs.



FILE TAB

When you left-click on the **File** tab, the **File** menu will appear. This menu is one of the most important menus within MS Excel 2010. It contains options for saving, opening, creating, and printing

documents. Some of these options like saving and printing will be covered later in this course.

HOME TAB

Another important tab within the **Ribbon** menu is the **Home** tab. Elements of the **Home** tab that will be covered in this course are the **Clipboard**, **Font** settings, **Alignment** tools, and the **Number** settings. In the **Home** tab screenshot below, you will notice that each of the separate elements within a tab is separated into boxes that contain a label or name at the bottom.

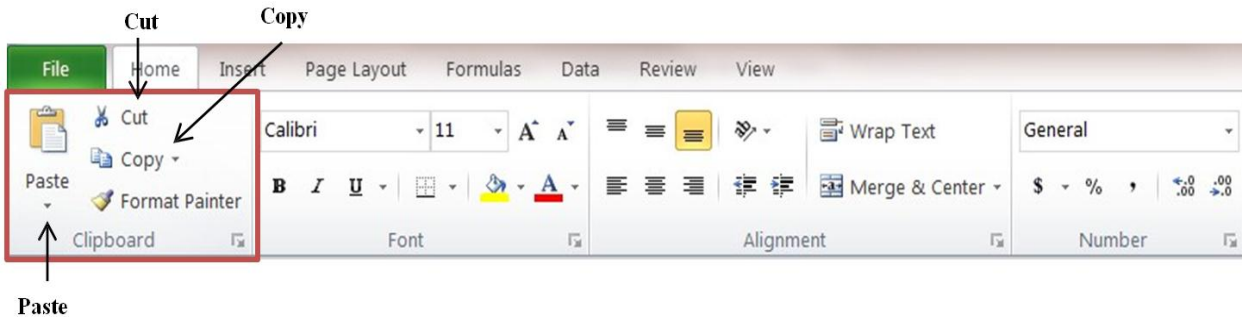
Clipboard

The **Clipboard** box allows you to cut, copy, and paste text and cells. Refer to the red box in the image below.

Cut – When text or cells are highlighted, you may click the **Cut** icon to remove that item from the current location and place it on another sheet or somewhere else in the current sheet by clicking the **Paste** icon.

Copy – When text or cells are highlighted, you may click the **Copy** icon to make a copy of the text or cells and then click the **Paste** icon to create a replica of the text or cells.

Paste – The **Paste** icon is used when text or cells have been cut or copied. This places the text or cells into the sheet.



Font

The **Font** box allows you to make changes to the font being used in a sheet. Refer to the red box in the image below.

Font – This drop-down menu allows you to choose a different font. If the text or cell is highlighted, you can preview a font by hovering over the font name. The highlighted text should change. The drop-down menu also displays the font name in the actual style of that font.

Font Size – This number refers to the size of a font. The smaller the number, the smaller the text will be.

You can select a size by clicking the upside down triangle next to the number. You can also manually change the font size by clicking in the number box and then entering a number.

Grow Font – The grow font icon will increase the font size each time you click it.

Shrink Font – The shrink font icon will decrease the font size each time you click it.

Font Color – To change the color of a font, you can highlight the text you would like to change and then select a color from the font color menu.

Text Highlight Color – To highlight text with a color (similar to a real-life highlighter) you can highlight the text to be changed and then select a color from the text highlight color menu.

Bold – To make text **bold**, highlight the text and then click on the bold icon.

Italic – To *italicize* text, highlight the text and then click on the italic icon.

Underline – to <u>underline</u> text, highlight the text and then click on the underline icon.

Borders – Allows you to place borders around cell.

Alignment

Tools included in the **Alignment** box that we will touch on in this course are aligning text and

merging cells.

Refer to the red box in the image below.

Alignment – The alignment options allow you to align text within a cell to the **left, right,** and **center**.

You can also align text to the **bottom** of a cell, **top** of a cell, and **middle** of a cell.

Merge – The merge options allow you to **merge cells and align text** within cells, **merge across cells, merge multiple cells,** and **unmerge cells.**

Number

The tools in the **Number** box are primarily used to format numbers. You can change numbers to a currency format, an accounting format, percentages, and more. Refer to the red box in the image below.

INSERT TAB

We will not be using the **Insert** tab in this course; however, it is a good tab to have knowledge of because it houses all the tools for creating graphs and tables within the **Charts** box.

Column – Allows you to turn data into a column chart.

Line – Allows you to turn data into a line chart.

Pie – Allows you to turn data into a pie chart.

Bar – Allows you to turn data into a bar chart.

Area – Allows you to turn data into an area chart.

Scatter – Allows you to turn data into a scatter chart.

Other Charts – Allows you to turn data into a stock, surface, doughnut, bubble, or radar chart.

BASIC KEYBOARD USAGE AND COMMANDS

IMPORTANT KEYS

In order to fully utilize Microsoft Excel (and other Microsoft products) it is important that we first understand how to use some of the basic keys and what they do when creating and using an Excel workbook. We will be reviewing the **Tab, Enter, Ctrl, Shift, Caps Lock, Spacebar, and Backspace** keys.

Tab – In Microsoft Excel, the Tab key automatically places you in the cell directly to the right of the cell you are currently in.

Enter – In Microsoft Excel, the Enter key automatically places you in the cell directly below the cell you are currently in.

Ctrl – Used in conjunction with other keys to perform shortcuts.

Shift – Used in conjunction with other keys to perform various operations.

Caps Lock – Locks the keyboard into caps mode. This means that all letters typed when caps lock is on will be capitalized.

Spacebar – Inserts a space between words as you type.

Backspace – Deletes letters already typed.

QUICK COMMANDS AND SHORTCUTS

There are various commands within Microsoft Excel that utilize some of these keys to perform shortcut operations. Examples of these operations are **copy, paste, bold, italic, underline, save,** and **print.** To perform any of these operations you must first hold down the **Ctrl** key and then press the corresponding letter while continuing to hold the **Ctrl** key. Some of these commands and their functions are outlined in the table below. You may want to refer back to this table further in this course.

Name	Command	Function
Copy	Ctrl + C	Copies any text that is highlighted.

Paste	Ctrl + V	Pastes any text that has been copied.
Bold	Ctrl + B	Bolds any text that is highlighted.
Italic	Ctrl + I	Italicizes any text that is highlighted.
Underline	Ctrl + U	Underlines any text that is highlighted.
Save	Ctrl + S	Saves the current document to the last place saved.
Print	Ctrl + P	Opens the print options menu.

Fig. 4.1 Main quick commands and shortcuts

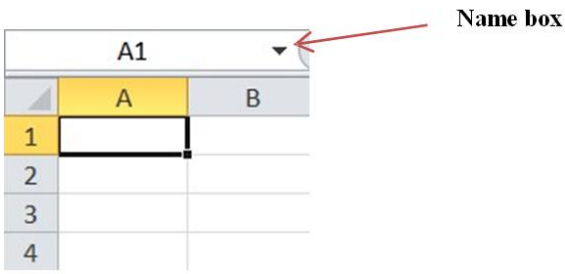
EXCEL LAYOUT BASICS

PAGE LAYOUT

In Excel, you will notice that the page looks like a grid divided up into boxes. These boxes are called **Cells**. All of the data that you enter into Excel must be entered into a **cell**. Further, you will notice that the page is arranged into **rows** and **columns**.

Each **row** going across the worksheet is labeled with a number.

Each **column** going up and down the worksheet is labeled with a letter.



You will notice in the top left corner of the screen that the cell you are editing will be designated with a letter followed by a number in the **name box**.

When you click on a cell you will know which cell you are editing because it will be highlighted with a black box. In the screenshot below, cell **A1** is highlighted in black with the A1 location listed in the **name box**.

PAGE BREAKS

Due to the fact that a sheet in Excel can be as long and wide as a user chooses, Excel offers the user the option of viewing page breaks. Page breaks appear as dotted lines running from side to side and up and down a sheet. These dotted lines, by default, separate pages based on the standard 8.5 by 11 page. Page breaks do not automatically appear in Excel.

L ET'S TRY SO ME STUFF

BEGINNING A NEW WORKSHEET

Once you have opened Microsoft Excel by selecting the icon from the Windows taskbar, clicking on it from the desktop, or opening it from the Microsoft Office folder, you are ready to begin your worksheet. You should see cell **A1** highlighted.

If you are in the classroom with us, we encourage you to try these functions as we go along. If you have a question or need to slow down, just ask.

If you are at home, open an Excel document and try for yourself!

For the purposes of this course, we will be creating a basic personal budget. Please refer to the **sample budget** on the last page of this document.

WORKING WITH TEXT

To type text or numbers, begin typing as you would on a typewriter or if you were searching something on the Internet. You should notice that the letters or numbers appear in the cell that you have selected.

Auto Filling Text

Then, move your mouse so that your cursor is hovering over the bottom right-hand corner of cell

B2. Your cursor should now look like a black plus sign. Like this: "+". When this sign appears, left-click on your mouse and hold the click.

While holding the click, drag your cursor to cell **M2** and let go of the left-click.

You should notice that Excel has now automatically filled in the rest of the months after January.

MOVING BETWEEN CELLS

There are multiple ways of moving between cells in Excel. To move to a cell directly below the one you are in, use the **Enter** key. To move to a cell directly to the right of the one you are in, use the **Tab** key. To move up, down, left, or right between cells, use the **Arrow** keys.

Addition

Using the addition formula in Excel is very similar to that of the subtraction and multiplication formulas. To complete an addition function, simply use the "+" sign instead of the subtraction or multiplication signs. This method is very simple and easy when adding two cells together; however, for the purposes of this course, we will be adding multiple numbers together.

Viewing and Editing Formulas

To view or edit a formula you have entered into a cell; simply double-click in the cell that contains the formula. You should then see the formula.

FORMATTING CELLS AND TEXT

If you take a look at the **sample budget**, you will notice that the text in the sheet varies in size. You will also notice that some of the text is bold and some of the text is aligned differently. Further, there are borders in the sample budget that do not currently appear on the sheet we have created. All of these tools are available in the **Home** tab of the **Ribbon** menu and are quick and easy to use.

Merging and Centering Cells/Text

Looking back at the **sample budget** you will see that the first line of the budget "Monthly Budget 2013" is bolded and centered above all of the other cells in the document. You will also see that thus far, we have not formatted our first line and that the text extends beyond the space of the cell. To center this text, we must use the tools located in the **Alignment** box of the **Home** tab in the **Ribbon** menu.

Making Cells Larger

While our title is now centered at the top of the worksheet, the cell that it is in is still not as wide as the one in the **sample budget**. Changing the width or length of a cell is simple and can be accomplished in two ways.

1. Dragging the Mouse

2. Double-clicking the Mouse

Note: If you notice that the content of any of your cells appears as pound symbols, like this: #####, Excel is informing you that the data in that cell is longer than the set size for the cell. To fix this, increase the size of the cell.

Aligning Text

By default, all text and numbers in a cell are aligned to the bottom left of the cell. Using the options available in the **Alignment** box of the **Home** tab in the **Ribbon** menu, we have the ability to align text to the left, center, and right of a cell, as well as aligning it to the bottom, top, or middle of a cell.

Bolding, Italicizing, and Underlining Text

If you have used Microsoft Word before, you are probably already familiar with the bold, italicize, and underline functions available in the **Font** box of the **Home** tab in the **Ribbon** menu.

To apply any of these options, simply click on the cell that you would like the text option applied to and click on the option from the **Font** box.

Increasing Font Size and Changing Font Type

Increasing the size of a font and changing the type of a font is similar to using the bold, italicize,

and underline options.

Changing Number Format

Excel allows you to change the format of the numbers that you use in a document. Users can add dollar signs, change types of currency, format numbers as percentages, as well as many other options.

Applying Cell Borders

Using borders in Excel is a great way to separate out information. By default, the cell lines that appear in an Excel worksheet do not appear when you print out the Excel worksheet. This is why it is important to use cell borders. Borders in Excel can also make a worksheet look more professional.

SAVING AND NAMING WORKBOOKS

The first time that you save a workbook, you will also be given the option of naming that workbook. The **Save** function is located in the **File** tab of the **Ribbon** menu.

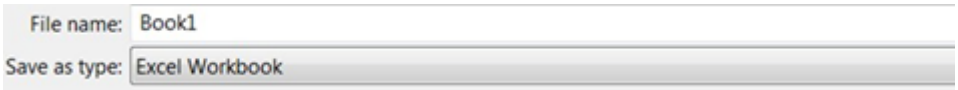
The first time you save a workbook, click on the **File** tab and then navigate to where it says **Save**. A pop-up box will then appear.

Choose the location you would like to save the workbook and then give it a name by typing it in the **File name** box.

Next, select the type of file you would like to save the workbook as from the **Save as type** menu.

By default, the **Excel Workbook** file type will be selected. The file extension will be **.xlsx**. This type of file is compatible and editable with MS Excel versions later than 2003.

If you wish to save the file so that you can edit it in versions of MS Excel from 1997-2003, choose the **Excel 97-2003 Workbook** option from the **Save as type** drop-down menu. This will save the file with the extension **.xls**.



Once you have saved a workbook for the first time, you will notice the document name appear in the **Title Bar.**

From now on, if you click the **Save** icon from the quick access toolbar or perform the **ctrl +s** shortcut, your most current version of the workbook will overwrite the last saved version.

To save a version without overwriting the original, use the **Save As** option from the **File** menu.

Note: It is always important to save your work as you are working on it. As a general rule, save every 10 minutes to avoid losing any work due to unforeseen circumstances.

CLOSING MICROSOFT EXCEL

When you are finished using Microsoft Excel, you may want to close the program. Microsoft Excel can be closed in two ways.

The first is by clicking the **X** in the top right-hand corner of the screen.

If your document has not been saved since the last time you have made any changes, a pop-up box will appear giving you the options to **Save**, **Don't Save**, or **Cancel**.

Selecting the **Save** button will overwrite the last saved version of the workbook.

Selecting the **Don't Save** button will close the program without saving the most recent changes.

Selecting the **Cancel** button will close the pop-up box and produce no action. Microsoft Excel will remain open. The second way to close the program is to select the **Exit** option from the **File** tab menu.

Congratulations! You have made it to the end of the Introduction to Microsoft Excel 2010 course. Your next step is to put some of these tools to use!

Try completing the attached **Sample Budget** on your own. If you are feeling up for more, try completing the **More Practice** sheet.

On the last page you will also find the **Sample Budget** with the formulas shown inside the cells. Please refer to this if you get lost.

FORMULAS

Another important function of Excel is the use of formulas. Excel is designed to automatically calculate formulas so you don't have to do them manually. Formulas that we will use in this course are **addition**, **subtraction**, and **multiplication**.

Each formula begins with an "=" sign.

Addition is symbolized using "+" **Subtraction** is symbolized using - **Multiplication** is symbolized using "*".

The use of formulas will make more sense later when we input formulas into our worksheet.

A **formula** in a spreadsheet, such as Excel, is a mathematical equation used to calculate a value.

A cell **reference** identifies the location a cell or group of cells in the spreadsheet. Sometimes referred to as a cell address, a cell reference consists of the column letter and row number that intersect at the cell's location. Note that when listing a cell reference, the column letter is always listed first.

Mathematical operators used in Excel

Subtraction - minus sign (-)

Addition - plus sign (+)

Division - forward slash (/)

Multiplication - asterisk (*)

Exponentiation - caret (^)

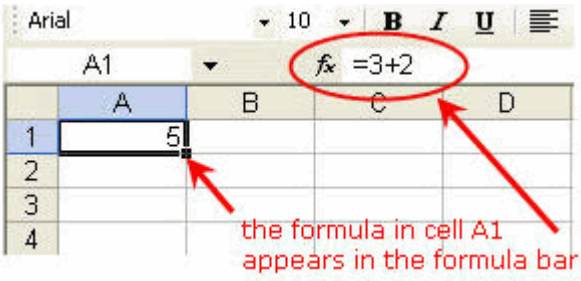
The order of operations in mathematics. Excel will do the math for you, but you need to know how to write the formula correctly. For example, in =3+6*2, the multiplication is done before the addition. First 6*2=12, and then 3+12=15.

Do things in brackets or parentheses first.

Exponents (roots and powers) come next.

Multiply or divide before you add or subtract.

Otherwise, go from left to right.



The **order of operations** can be overridden by adding parentheses to a specific portion of a formula.

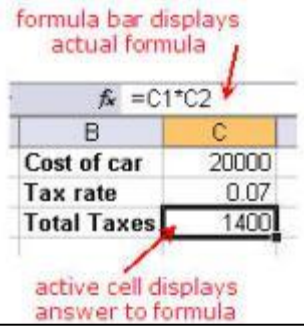
Please **E**xcuse **M**y **D**ear **A**unt **S**ally: **P**arentheses, **E**xponents (Powers and Square Roots, and so on), **M**ultiplication, **D**ivision (work from left to right), **A**ddition, and **S**ubtraction (work from left to right)

BEDMAS **B**rackets, **E**xponents, **D**ivision, **M**ultiplication, **A**ddition, **S**ubtraction

All formulas must begin with either an equal sign or an addition sign. Equal sign informs Excel that what follows is part of a formula, and not just a name or a number. Excel formulas look like this: **=3 + 2** **r**ather than: **3 + 2 =**

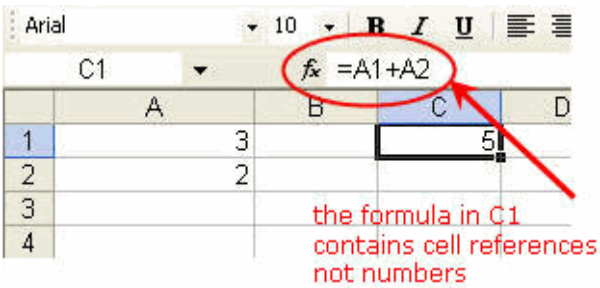
The Formula Bar and its uses

The formula bar in Excel is located above the work area of the spreadsheet. The formula bar displays the data or formula stored in active cell. The formula bar can be used to enter or edit a formula, a function, or data in a cell.



the

Manually entering a formula into a worksheet cell



The cell reference is a combination of the column letter and row number - such as **A1**, **B3**, or **Z345**. When writing cell references the column letter always comes first. (either upper or lower case)
So, instead of writing this formula in cell C1: = 3 + 2 write this instead: = A1+A2

Write formulas so that you can change the data without having to change the formulas themselves. To do this, you need to tell Excel which cell the data is located in. A cell's location in the spreadsheet is referred to as its cell reference. To find a cell reference, simply look at the column headings to find which column the cell is in, and across to find which row it is in.

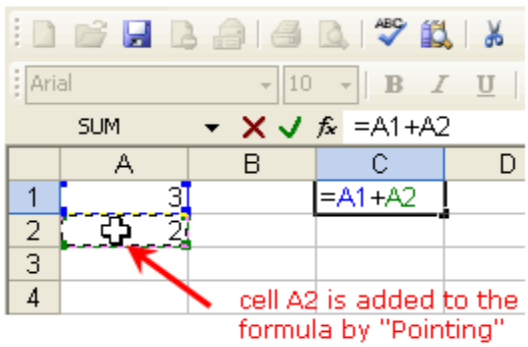
Enter a formula using the point and click method.

After typing the equal sign, you have two choices for adding cell references to the spreadsheet formula.

You can type them in or

You can use Excel feature called Pointing

Pointing allows you to click with your mouse on the cell containing your data to add its cell reference to the formula.



1. Type an equal sign in cell C1
2. Click on cell A1 with the mouse pointer to enter the cell reference into the formula
3. Type a plus (+) sign
4. Click on cell A2 with the mouse pointer to enter the cell reference into the formula
5. Press the ENTER key on the keyboard
   The answer 5 should appear in cell C1.

Entering a formula that begins with both the equal sign and the addition sign.

In spreadsheet programs such as Excel, Open Office Calc., and Google Spreadsheets formulas must begin with an equal (=) sign.

In Lotus 1-2-3 and Quattro Pro, formulas begin with a plus (+) sign.

Copying Formulas

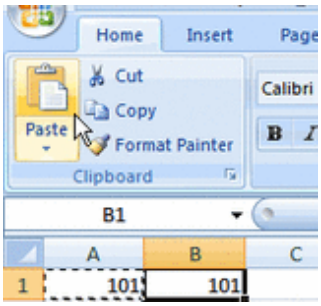
Copying formulas prevents repeated entry of the same formula.

Most formulas contain relative references that will automatically adjust to the pasted area.

A relative cell reference identifies the location of a cell or group of cells.

Copy a formula in a single cell and paste that formula to a new location using the Clipboard Group

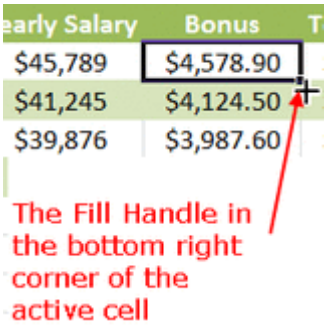
on the Home Ribbon.

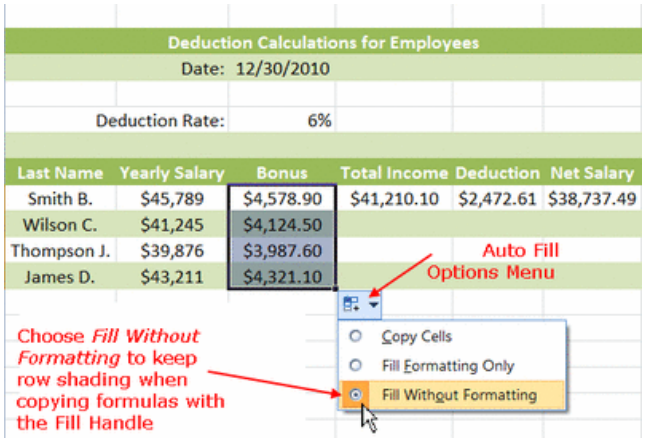


1. Highlight the cell
2. Click the Copy command
3. Highlight destination cell
4. Click the past command

Demonstrate how to use the fill handle to copy a formula to multiple cells.

If you have more than one row or column of data that you need to perform calculations on, it is often possible to copy the first formula to other cells. The easiest way to do this is to copy formulas with the fill handle





As the formulas are copied to the additional rows, Excel will automatically update the cell references in the formulas to match the new rows.

Copy a formula in a single cell and paste that formula to a new location using the shortcut menu and keyboard shortcut keys.

Copy – CTRL + C

Paste – CTRL + V

Working with Cell References

Relative cell references - identifies the location of a cell or group of cells and is defined by the number of cells between the row and column of the cell being referenced and that of the cell containing the formula.

By default, a spreadsheet cell reference is relative. What this means is that as a formula or function is copied and pasted to other cells, the cell references in the formula or function change to reflect the function's new location

An example of a relative cell reference would be C4, G15, or Z2345.

When listing a cell reference - either relative or absolute, the column letter is always listed first.

Absolute cell references – is used when you want a cell reference to stay fixed on a specific cell.

This means that as a formula or function is copied and pasted to other cells, the cell references in the formula or function do not change.

An example of an absolute cell reference would be C4, G15, or A345.

Note: An easy way to add the dollar signs to a cell reference is to click on a cell reference and then press the **F4** key on the keyboard.

Create a formula using absolute row references.

Only put the $ in front of the row number Ex. C$4

The column can change but the row number will stay the same

Create a formula using absolute column references

Only put the $ in front of the column letter Ex. $C4

The column will stay the same and the row number will change

Demonstrate how to create a formula using absolute cell references.

Put a $ in front of the column letter and the row number Ex. C4

Both the column and the row number will stay the same no matter where the cell reference is copied or filled to.

A1	Relative cell reference
A1	Absolute cell reference
$A1	Column absolute cell reference
A$1	Row absolute cell reference

Cutting and copying formulas

When you cut and paste formulas containing Relative references, the references are NOT adjusted automatically.

When you copy and paste formulas containing Absolute references, the references are NOT adjusted automatically.

When you cut and paste formulas containing Absolute references, the references are NOT adjusted automatically.

A quick way to copy formulas is to use the AutoFill handle in the bottom right hand corner of the active cell.

When you copy a formula that contains mixed references the only part that is adjusted automatically is the row or column that does not have a $ sign in front of it.

When a formula is moved as opposed to copied, the relative references are not automatically adjusted.

Editing Formulas

Formulas can be edited at any time after the formula is created using the formula bar or by double clicking the cell and making changes directly in the cell.

Hot Key – Editing Mode – F2

Exploring Functions

Function - A function is a preset formula in Excel. Like formulas, functions begin with the equal sign (=) followed by the function's name and its arguments. The function name tells Excel what calculation to perform. The arguments are contained inside round brackets.

Function name – The name used to identify the function

Argument – In Excel, arguments are used in functions. They are the part of the function enclosed in round brackets (parentheses) following the function's name. Arguments supply the data for the function to use in its calculations. In Excel, arguments are most likely to be cell references.

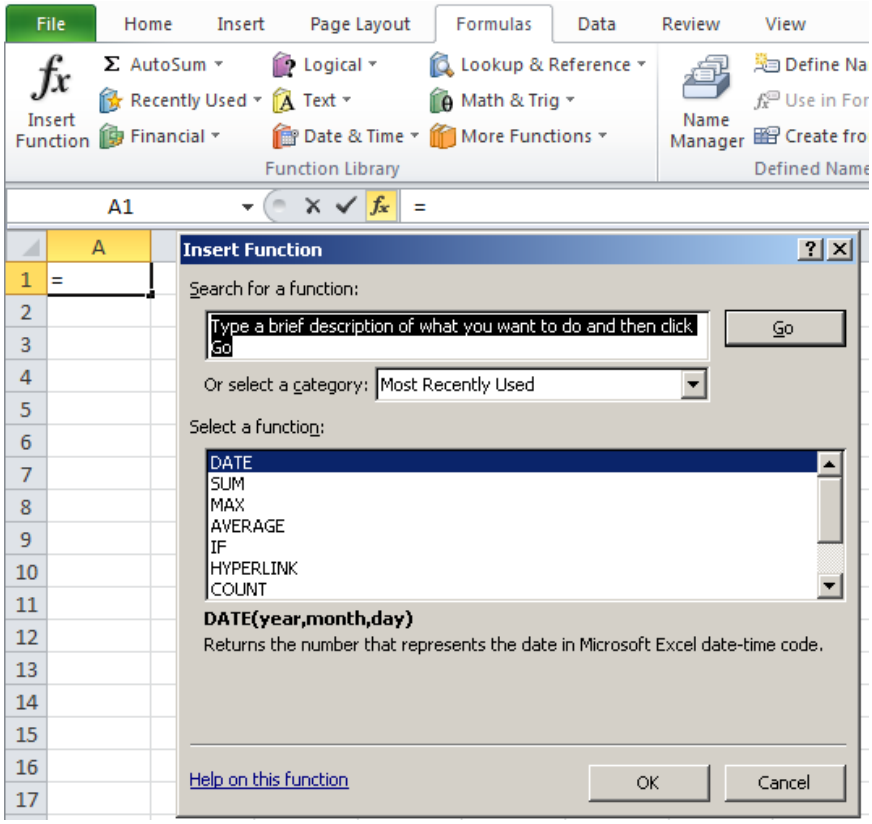
Example: =SUM(A1:A6)

In this example, the argument for the SUM function is the range (A1:A6).

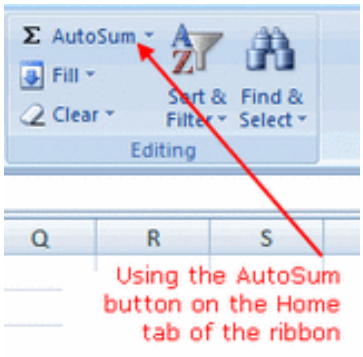
Manually enter a function into a cell by typing = (equal sign) the name of the function - open parenthesis - the beginning cell reference - colon - the ending cell reference - close parenthesis.

The function will appear in the formula bar

Create a formula using a function from the **Insert Function button** on the Formula Bar.



1. Click on the Insert Function Command on the Formula Ribbon
2. Select the function
3. In the Function Argument Dialog box type in the cell range or highlight the cell range on the spreadsheet
4. Click OK or press Enter



The **AutoSum** Feature is a shortcut provided for using the SUM function. When you click on the AutoSUM button, the SUM function is entered into the active cell.

To use the AutoSUM button - Click on the cell where you want the answer to appear. Click on the AutoSUM button.

The function will auto select the closest range of data cells. The selected cells are surrounded by the marching ants.

Check to make sure that the selected range for the function is correct.

If it is correct, press Enter on the keyboard.

If it is incorrect, drag select with the mouse the correct range and then press Enter on the keyboard.

AutoSUM's rules for selecting a range

The order that AutoSUM follows in suggesting a range of data for the function is:

The uninterrupted group of cells containing data above the active cell.

The uninterrupted group of cells containing data to the left of the active cell.

If there is no data in the cells above or to the left, AutoSUM doesn't select a range, but waits for you to do so.

Note: Do not assume that the range that AutoSUM selects is always correct.

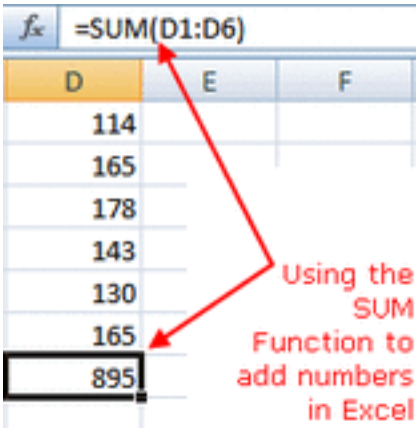
The AutoSum button is located in the Editing Group on the Home Ribbon.

Copy a formula that was created using the AutoSum button by copying the AutoSum formula and paste using the function command.

The NOW function - is one of Excel's date and time functions, is used to add the current time and date to a spreadsheet. The syntax for the NOW function is:

= NOW ( )

Create a date formula using the Date function from the Insert Function button on the Formula Bar.



Select the cell, click the function command near the formula bar, select the Date function, and in the Dialog box type in the current date information and click ok and the date will appear in a formula format.

The date and time functions are based upon the computer system's date and time.

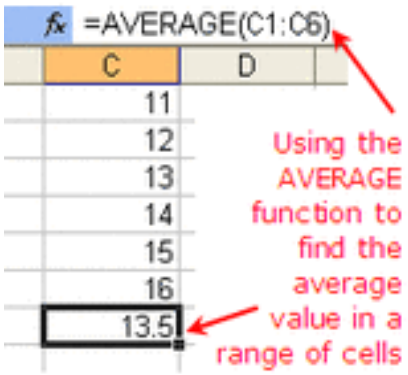
Dates are more useful as formulas rather than as constants.

The basic statistical functions:

SUM - provides a quick way to add columns or rows of numbers together

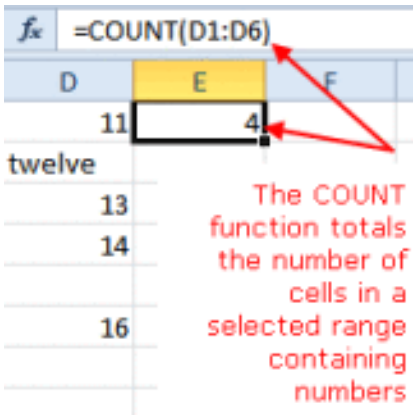
=SUM (Number1, Number2, ... Number255)

AVERAGE - is used to find the average or arithmetic mean of a given list of arguments.



= AVERAGE (argument1, argument2, ... argument255) Argument1, argument 2, ... argument 255 can be

COUNT - is one of a group of Count Functions that can be used when you need to total the number of cells in a selected range.

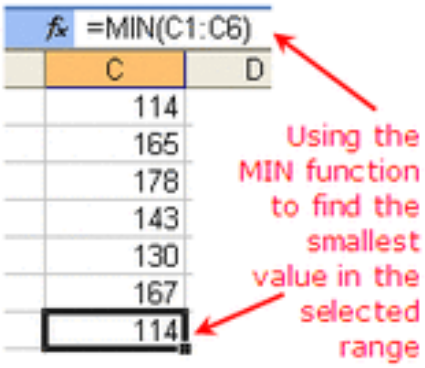


The COUNT function's job is to only add up the cells in a selected range that contain numbers. It ignores empty cells or those contain text. If a number is later added to an empty cell the function will be automatically updated to include this new data.

Be aware that dates, times, functions, and formulas are stored as numbers in Excel. The COUNT function will, therefore, include any cells containing these types of data in the total.

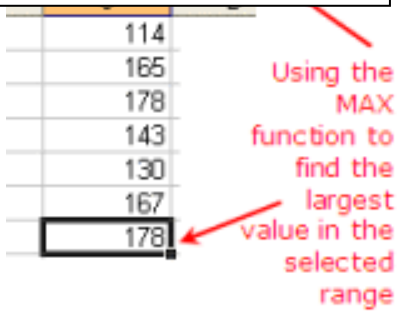
=COUNT(Range)

MIN - is used to find the smallest or minimum value in a list of numbers or arguments.



=MIN (argument1, argument2, ... argument30) Argument1 ... argument 30: Arguments can be numbers named ranges arrays or cell references

MAX - is used to find the largest or maximum number in a



given list of values or arguments.

=MAX(argument1, argument2, ... argument30)

Argument1 ... argument 30: The arguments can be numbers,

Manually create a formula using the basic statistical functions by selecting the cell you would like the results in – type an equal sign and the syntax for the function followed by the range of the data in parentheses.

Create a formula using the More Functions option under the Sum Command in the Editing Group. **HotKey** – Insert Sum Function – **ALT + =**

Using Logic in Formulas

Logical function - is a comparison between two amounts

Functions	What it Does
AND	Returns TRUE if all its arguments are TRUE
IF	Specifies a logical test to perform
NOT	Reverses the logic of its argument
OR	Returns TRUE if any argument is TRUE

Comparison operators

The comparison operators that can be used in the logical test are:

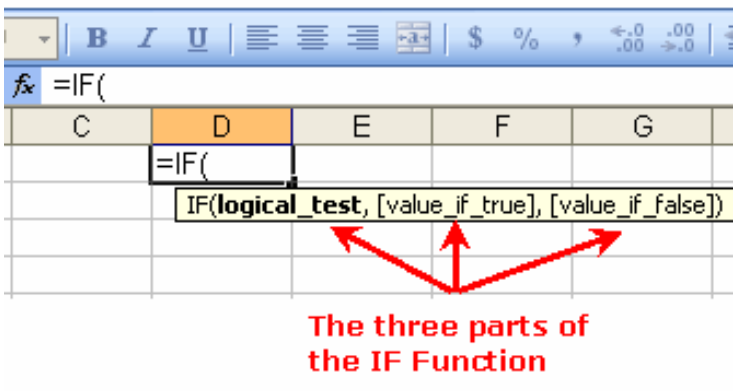
Equals (=) Less than (<) Less than or equal to (< =) Greater than (>) Greater than or equal to (> =)

Not equal to (< >)

Examples

The logical test can be a comparison between two cell references such as: A3 > B3

Or the logical test can be a comparison between a cell reference and a fixed amount such as: C4 < = 100



IF function - returns values based on true or false results from a logical test.

Parts of the Excel IF function

Inside the round brackets there are three parts or arguments to an IF Function.

The Arguments

the logic test - in this tutorial it is A3 > B3

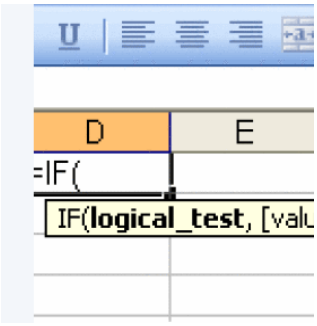
the value if true - in this tutorial it is "A is larger"

the value if false - in this tutorial it is "B is larger"

Between each argument of the IF function, the comma is used as a separator. The comma is what tells Excel when each argument of IF function ends and the next section begins.

Therefore, as we complete the IF function, we will add two separators one between the logical test and the “value if true” arguments one between the “value if true” and the “value if false” arguments.

Create a formula using the If function.



Click on the cell with your mouse pointer and type the equal sign followed by the “IF” keyword and a left or opening round bracket. So far in cell D1 you should have =IF(The Arguments

the logic test - in this tutorial it is A3 > B3 the value if true - in this tutorial it is "A is larger" the value if false - in this tutorial it is "B is larger" Between each argument of the IF function, the comma is used as a separator. The comma is what tells Excel when each argument of IF function ends and the next section begins.

In this tutorial we are comparing the values in cells A3 and B3. Between the two values we place a comparison operator. Since we want to know if A3 is greater than B3, we will use the **Greater Than** operator " > " between the two cell references.

type A3 > B3 followed by a comma "," In cell D1 you should now see: =IF(A3 > B3, Following our comma separator, we add in the “value if true” argument of the IF function followed by another comma separator.

In this case, if the value in cell A3 is greater than the value in cell B3, we want the function to place a "A is larger" in cell D1.

type "A is larger" followed by a second comma "," In cell D1 you should see:=IF(A3 > B3,"A is larger", The last section to add to the IF function is the “value if false" argument of the function followed by the right or closing round bracket.

In this case, if the value in cell A3 is not greater than the value in cell B3, we want the function to place a "B is larger" in cell D1.

type "B is larger" followed by a right or closing round bracket ")". In cell D1 you should see the completed IF function: =IF (A3 > B3,"A is larger ","B is larger")

Nested functions in Excel refer to combining the operations of two or more functions in one cell.

Creating a Three-Dimensional Formula

Three-dimensional functions allow for formulas to access data in other worksheets or workbooks. You can use references to perform calculations on cells that span a range of worksheets in a workbook. This technique is extremely useful if you want to summarize a group of worksheets that all have an identical layout. Three-dimensional formula using values can be created from several worksheets within the same workbook and from several different workbooks. Click the cell where you want to enter the function

Type equal sign and enter the name of the function and type an opening parenthesis

Click the tab for the first worksheet that you want to reference

Hold down SHIFT and click the tab for the next or the last if they are in consecutive order tab that you want to reference. Select the cell or range of cells that you want to reference

Close parenthesis and press ENTER.

Tasks for self-check:

Task 1:

1. WHEN YOU ENTER DATA INTO A CELL AND PRESS THE ENTER KEY ON THE KEYBOARD, THE CURSOR WILL MOVE TO ___.

a) the cell to the right of where you entered the data
b) the cell to the left of where you entered the data
c) the cell below the cell where you entered the data
d) the cell above the cell where you entered the data
e) it will not move

2. THE MEASURE OF HE RELATION BETWEEN TWO OR MORE VARIABLES

a) correlation
b) set
c) mode
d) method
e) statistics

3. THESE VARIABLES ALLOW US NOT ONLY TO RANK ORDER THE ITEMS THAT ARE MEASURED, BUT ALSO TO QUANTIFY BUT ALSO TO QUANTIFY AND COMPARE THE SIZES OF DIFFERENCES BETWEEN THEM

a) ordinal
b) alternative
c) interval
d) ratio
e) nominal

4. WHAT IS THE NAME OF NUMERICAL CHARACTERISTIC WHICH QUANTITIES OF UNIFORM QUALITY THAT CHARACTERIZES A NUMBER OF STATISTICAL AGGREGATE OF ALL SET?

a) mode
b) median
c) standard deviation
d) correlation coefficient
e) the average

5. THIS VALUE OCCURS MOST OFTEN IN A SERIES OF OBSERVATIONS

a) mode
b) the average
c) median
d) standard deviation
e) correlation coefficient

Task 2.

In a table results of observation on heart rate and respiration rate in the patients group are present.

Heart rate	120	84	105	92	113	90	80	72	98	102	95
Respiration rate	20	15	18	16	19	16	15	12	18	20	17

1) Build diagram (histogram).

References:

Basic.

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Additional.

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3. www.ncbi.nlm.nih.gov (Національна бібліотека медицини США)
4. www.cochrane.ru (Розділ Кохранівського співтовариства)

The methodical guidance has been completed by **S.Y. Olenets**