King Saud University

COLLEGE OF ENGINEERING

GE 204

COMPUTER APPLICATIONS IN ENGINEERING

Lab Exercises and Homework

Version 1.1

Legend

The GE 204 lab exercise notes follows a selective formatting convention to make it easier for the students to follow the instructions. The next tables lists the formatting:

Formatting type	Used to signify	Example
Normal text	Normal lab instructions	Text
Bold, UPPERCASE, bordered text	Keys	**TEXT**
Bold, double wave underline	Text to type	**Text**
Italic	Variables, emphasis, already-typed text	*Text*
Black background	Menu and toolbar items	Text
Outlined text	Icons	Text
`Courier font`	Matlab commands	`Text`

KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
GE 204 - COMPUTER APPLICATIONS IN ENGINEERING

Microsoft Windows

Windows Exercise

Objectives: Turning computers on; starting Windows; desktop layout, Start button; using Windows Help; opening, moving, and resizing windows; formating floppy disks; using Windows Explorer; creating new folders; moving, copying, and deleting a file; recovering deleted files; shutting down the computer.

Start the Computer

Start your computer by turning the power of the system unit and the monitor on using on/off switches.

If the computer needs User Name and Password ask the lab instructor for it and write it here. You will need to use it for accessing lab computers during this course, so *write it down*!

User Name
Password

Your system may take a minute or so to get started after which you should see the desktop.

Check the items you see on your desktop.

Start menu and Cascading Menu

Point to the Start button, click the left mouse button. What do you see?

Click on the program icon seen in the Start menu. What do you see? What is the name of this menu?

Click on any other button that has an arrow. Describe the cascading menu that will appear.

Open My Computer

Point to My Computer icon, and double-click it. My Computer window will appear. Describe the items seen in this window?

Click on View or use **ALT+V** to open a pull-down menu. Click on Toolbar command. What will happen?

Click Status bar command. What happens?
Click on Large Icon and see what will happen.

Move and Size a Window

Click on the Maximize button. What happens?

Click on the Restore button. Does the window return to its previous size?

Click on the Minimize button. Do you see the window on the screen? How can you restore it?

Click on the My Computer icon to open another window.

Click and drag the title bar. Does the window move to another place?

Using Windows Help

Click on Start button, then Help command. What you will see?

Click on index, type **format disk**. What you will see?

Click on disks, then click display button. Help topics dialog box is replaced by a Windows Help window with instructions on how to format a disk.

Formatting a Floppy Disk

Place a floppy disk in drive A: What happens if you format a disk?

Click the icon for drive A:. What happens?

Set the capacity. What is the capacity of your floppy disk?

Uncheck Quick Format to choose a full format

Click Start button.

What you will see at the end when the disk is formatted?

Close the format dialog box, close the Help window, close My Computer window.

Create a New Folder

Start Windows Explorer. Place the floppy disk in drive A:. Describe the contents of the window.

Click the icon for drive A: in the lift pane of the Windows Explorer window.

Click File in the Main menu. What do you see?

Click New, then click Folder. What do you see?
Erase the name and type **GE204**, then click outside. What do you see?

Copy a file to Disk A:

Click the plus sign next to the *Windows* folder, then click *Command* folder. What do you see? What does the plus or minus sign mean?

Click on any file (e.g. **CONFIG.SYS**). then click Edit in the main. Describe the pull down window.

Click Copy and close the window.

Point to drive A:, then click Edit > Paste. Do you see the file **CONFIG.SYS** in drive A:?

You can use the icons on the Toolbar to copy and paste.

You can copy complete folders that way too. Try it yourself.

Move a File to a New Folder

Click the plus sign next to drive A:. What do you see?

Click and drag the file **CONFIG.SYS** from drive A: to the folder *GE204*. Where do you see the file on drive A:?

Click the plus sign next to *GE204*. Do you see the file in *GE204* folder?

You can used Cut and Paste icons on the Toolbar. Try it yourself. You can also move complete folder that way.

Delete a File or a Folder

Click *GE204* Folder, then point to **CONFIG.SYS** file.

Click File on the main menu, then click Delete. Do you see the file?

Point to *GE204* folder, then click File > Delete. Is *GE204* folder still there?

Recover a Deleted File

Click the Recycle Bin on the Desktop. Do you see anything in it?

Click Recover. Remember that if you delete from the drive A:, you will not find the deleted files in the Recycle Bin.

Create a Shortcut

Close all windows. Go to Start > Programs and point, but don't click, to the Microsoft Word icon. Right-click and choose Copy, then go to the desktop, right-click and choose Paste Shortcut. This will create a shortcut to the program without having to navigate the Start menu.

Shut Down the Computer

Click Start button, then click Shut Down command. What you will see? Click Shut Down to turn off the PC.

KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
GE 204 - COMPUTER APPLICATIONS IN ENGINEERING

Microsoft Word

Word Exercise # 1

Objectives: Getting familiar with typing and editing using Word; opening and editing a previously saved document; text formatting.

Start Word To start Word, double-click the Word program icon.

Insert Text Word begins with a clean document window titled *Document1*, therefore, start typing the following message now.

Type the following message without pressing **ENTER** at the end of each line (make sure the font is *Times New Roman*):

Because the easiest way to learn is by doing, these exercises walk you through the process of creating a document in Word for Windows. Here you can practice the basics and get familiar with Word features.

Notice that the insertion point moves to the next line when a line is filled with text.

1- Place the insertion point before "*Word features*"
2- Type **some of** , and then press the **SPACE BAR**.
3- Move the insertion point to the end of the paragraph
4- Press **ENTER** twice.
5- Type the following sentence EXACTLY:

Frist you will produce a document by creating its contents, and then edit, save, and print it.

Save a Document When creating any computer file, you should always save it to protect against the possibility of data loss. To save the above document to a disk,

1- Choose File from the Main menu, and then choose Save As.
2- Type *a:word1* in the File Name text box, then choose Save.

Use Typeover Instead of pushing text forward when you type, you can choose to type over existing text. The typeover feature is useful for correcting minor mistakes.

l- Place the insertion point just before the letter "F" in *Frist* (second paragraph).
2- Press the **INSERT** (**INS**) key to begin typeover (**OVR** should be displayed at the bottom of the screen).
3- Type **First** over *Frist*.
4- Press **INSERT** to turn off typeover (**OVR** should disappear).

Insertion Point (IP) In addition to using the mouse and the ⇧⇩⇨⇦ to move the insertion point, there are:

CTRL+**HOME**	moves the IP to beginning of the document.
CTRL+**END**	moves the IP to the end of the document.

1- Press **CTRL**+**HOME**.
2- Press **ENTER** twice.
3- Type the following heading, and press **TAB** key after each colon to make the words start concurrently.

To: *All GE 204 Students*
From: *Instructors*
Date:
Subject: *Exercise No. 1*

4- Press **ENTER** three times.

Insert the Date To have Word insert the current date:

Choose Date and Time from Insert menu, and then choose the desired date format from the dialog box.

Center Text We will write a title for the memo you have on the screen. Titles are usually placed on the center of the page.

1- Press **ENTER** twice to insert two blank lines.
2- Go the top of the page (**CTRL**+**HOME**).
3- Select the Center icon  from the Toolbar.
4- Type **Exercise No. 1** for the memo title.
5- Select the Align Left icon  from the Toolbar to end centering

Select Text You can select text as follows:

1- Drag the mouse across the desired text.
2- Click twice on a word to select it.
3- To select a line, click once in the selection bar.
4- To select a paragraph, click twice in the selection bar.
5- To select the whole document, press down the **CTRL** key then click anywhere in the selection bar.

Practice the above.

Select and Delete When you select text, and then press the delete (**DEL**) key, the selected text is deleted

l- Double-click the word "*Because*" in the first sentence to select it.
2- Press **DEL** once to delete the word.

3- Select Undo option from the Edit menu to cancel the **DEL** command.

Change Font and Font Attributes To change the font type and size of the memo title,

1- Select the title "*Exercise No. 1*"
2- Select "Courier New" from the Font list in the Toolbar.
3- Select size 20 from the Font size list in Toolbar.
4- Select Bold icon **B** from the Toolbar.

The document should appear like:

Exercise No. 1

To: All GE 204 Students
From: Instructors
Date: January 25, 2002
Subject: Exercise No. 1

Because the easiest way to learn is by doing, these exercises walk you through the process of creating a document in Word for Windows. Here you can practice the basic and get familiar with some of Word features.

First you will produce a document by creating its contents, and then edit, save, and print it.

The Ruler

View the Ruler To display the Ruler:

Choose Ruler from View menu (if the ruler is not displayed)

Delete and Set Tabs To delete a tab:

l- Move the insertion point to the first line of the memo (before *To: All GE204 Students*).
2- Move the mouse pointer to the lower half of the ruler.
3- Drag the tab marker at the 0.5" position outside the ruler.
4- Repeat step 3 for the second and third line of the memo.

Notice the change of the format of the memo.

Tab Setting Practice setting tap locations:

1- Move the insertion point to the lower half of the ruler.
2- Click at 1.25" and 2.25" to set tab stops at 1.25" and 2.25" respectively.
3- Delete the tab placements by dragging the tab icon outside the Ruler.

Set Margins You can change the margins by changing Page Setup from the File menu

To change the left margin,

1- Move the margin marker to the lower half of the ruler by clicking on it.
2- Drag the left margin marker to the 1.5" position.

To change the right margin, drag the right margin marker to the 7" mark.

Change Line Spacing Choose double spacing from Paragraph option in the Format menu.

Change Justification Choose Justify icon  from the Toolbar.

Hide the Ruler To hide the Ruler,

Choose Ruler from the View menu.

The document now should look like:

Exercise No. 1

To: All GE 204 Students
From: Instructors
Date: January 25, 2002
Subject: Exercise No l

Because the easiest way to learn is by doing, these exercises walk you through the process of creating a document in Word for Windows Here you can practice the basic and get familiar with some of Word features.

First you will produce a document by creating its contents, and then edit, save, and print it

Cut, Copy, and Paste

Cut and Paste Suppose you want to move the third line in the memo's header to the end of the header. To do this,

1- Select the third line (*Date:*) by clicking once in the selection bar
2- Choose Cut from the Edit menu.
3- Move the insertion point to the end of the header,
4- Choose Paste from the Edit menu.

You can also use the Cut  , Copy  and Paste  buttons from the Toolbar

Copy and Paste You can copy and paste rather than cut and paste.

The final document should look like the following:

Exercise No. 1

To: All GE 204 Students
From: Instructors
Subject: Exercise No l
Date: January 25, 2002

Because the easiest way to learn is by doing, these exercises walk you through the process of creating a document in Word for Windows Here you can practice the basic and get familiar with some of Word features.

First you will produce a document by creating its contents, and then edit, save, and print it.

Print a Document To print the above document,

1- Choose File from the main menu, and then choose Print.

(the Print dialog box lets you make all printing decisions before your document is sent to the printer. For previewing the page layout and making the final adjustments before printing, choose Print Preview from File menu.)

2- If you are ready to print, choose Print.

Quit Word When you are finished, always quit Word before turning off your computer.

Choose File from the main menu, then choose Exit.

Make sure to save your file to a floppy disk in drive A before quitting. You can print the file before quitting Word.

KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
GE 204 - COMPUTER APPLICATIONS IN ENGINEERING

Microsoft Word

Word Exercise # 2

Objectives: Using tables and equations; inserting symbolic characters in Word; opening Word documents; bullets and numbering.

Create Tables To create a table:

l- Go to Table > Insert > Table.
2- Choose 4 for no. of columns and 6 for no. of rows.

Now, you should have an empty table of 4 columns and 6 rows, like the one shown below. (You can also create the same table by selecting the Table icon  from the Toolbar).

Selecting Cells, Rows and Columns To select a cell, row, or a column, you can use the standard convention of dragging the mouse across the desired cells.

You can use the selection arrow to do the same thing as follows (practice while reading instructions!):

l- To select a cell, move the I-beam to the left border of the desired cell until the I-beam becomes an arrow, then click.
2- To select a row, move the I-beam to the left border of any cell in the desired row, until the I-beam becomes an arrow, then click.
3- To select a column, move the I-beam to the top border of the top cell in the desired column until the I-beam becomes an arrow, then click.
4- To select all cells, move the I-beam to the top or left border of the first cell until the I-beam becomes an arrow, then drag the mouse along the top or left border.

Joining Cells This feature allows you to join cells, such that headings and other titles can be typed. Here, we will join the four cells in the top row. To do this:

1- Select the top row of cells.
2- Choose Table from the Main menu, then choose Merge Cells

The table should look like this:

Filling In a Table You can move from cell to cell by clicking the desired cell, or pressing the **ARROW KEYS**. You can also press **TAB** to move to next cell.

Now, do the following,

1- Move the insertion point to cell r1c1 (row one column one), and then type **Operating Expense**.
2- Go to cell r2c1, and type **Expenses**.
3- Go to cell r2c2, and type **Fourth Quarter**.
4- Go to cell r2c3, and type **Third Quarter**.
5- Go to cell r2c4, and type **Change**.

Now, that you know how to move through a table, and how to enter text,

6- Type the following information in rows three through six of the table.

Pay-roll	**330,485.00**	**289, 800.00**	**14.04%**
Taxes	**33,300.00**	**12,073.00**	**194.00%**
Rent	**29,600.00**	**29,600.00**	**0.00%**
Communications	**26,277.30**	**17,803.30**	**47.60%**

Now, the table should look like this:

Operating Expenses			
Expenses	Fourth Quarter	Third Quarter	Change
Payroll	330,485.00	289, 800.00	14.04%
Taxes	33,300.00	12,073.00	194.00%
Rent	29,600.00	29,600.00	0.00%
Communications	26,277.30	17,803.30	47.60%

Changing Column Width You can easily change the width of columns using the mouse.

1- Drag the border line between the second and third column slightly to the right.

2- Drag the border line between the third and fourth column slightly to the right.

The table should look like this:

Operating Expenses			
Expenses	Fourth Quarter	Third Quarter	Change
Payroll	330,485.00	289, 800.00	14.04%
Taxes	33,300.00	12,073.00	194.00%
Rent	29,600.00	29,600.00	0.00%
Communications	26,277.30	17,803.30	47.60%

Change Font, and Font Attributes You can change the appearance of the text in a table using this feature.

1- Select the two top rows of the table.
2- Select Bold and Center icons from the Toolbar. Now, the table should look like this:

Operating Expenses			
Expenses	**Fourth Quarter**	**Third Quarter**	**Change**
Payroll	330,485.00	289, 800.00	14.04%
Taxes	33,300.00	12,073.00	194.00%
Rent	29,600.00	29,600.00	0.00%
Communications	26,277.30	17,803.30	47.60%

Adding a Row You can always add a row to the bottom of the table. To do this,

1- Position the insertion point at the last cell (r6c4).
2- Press the **TAB** key.

The table now should have a seventh row added to it.

3- Type in the following numbers in the seventh row
Total Change 421,862.50 349,278.50 20.78%
4- Select the words "*Total Change*", then select Bold icon from the Toolbar.

The table should look like this:

Operating Expenses			
Expenses	**Fourth Quarter**	**Third Quarter**	**Change**
Payroll	330,485.00	289, 800.00	14.04%
Taxes	33,300.00	12,073.00	194.00%
Rent	29,600.00	29,600.00	0.00%
Communications	26,277.30	17,803.30	47.60%
Total Change	421,862.50	349,278.50	20.78%

Aligning Columns You can align information in a column by,

1- Select all of the cells in second, third and forth columns, except the column headings.
2- Select the Center icon from the Toolbar.

All of the numbers in the columns are centered. The table now should look like:

Operating Expenses			
Expenses	**Fourth Quarter**	**Third Quarter**	**Change**
Payroll	330,485.00	289, 800.00	14.04%
Taxes	33,300.00	12,073.00	194.00%
Rent	29,600.00	29,600.00	0.00%
Communications	26,277.30	17,803.30	47.60%
Total Change	421,862.50	349,278.50	20.78%

Changing Border Style You can alter the look of a table by changing the borders

1- Select the column headings (second row).
2- Choose Border from the Format menu.
3- From the dialog box, click at the lower line of the table shown in the border box to select the lower line, then select thicker line from the line option, and choose OK.
4- Repeat the same procedure for the sixth row. The table is now complete and should look like:

Operating Expenses			
Expenses	**Fourth Quarter**	**Third Quarter**	**Change**
Payroll	330,485.00	289, 800.00	14.04%
Taxes	33,300.00	12,073.00	194.00%
Rent	29,600.00	29,600.00	0.00%
Communications	26,277.30	17,803.30	47.60%
Total Change	421,862.50	349,278.50	20.78%

Equation Editor The Equation Editor lets you create and edit mathematical equation to be included in Word documents

To access the Equation Editor,

1- Go to Insert > Object
2- Select *Microsoft Equation 3.0* from the selection box, then select OK

Once, you have successfully accessed the *Equation Editor*, the *Equation Editor* window will appear.

3- Type in: **y = a + bx**
4- Choose Update from the File menu, then choose Exit and Return from the same list.

Now, The equation is pasted in the main document $y=a+bx$. Let's say that the equation should read a_1 instead of a, then,

5- Double-click on the equation itself, the *Equation Editor* will appear and show the same equation.
6- Place the insertion point after the letter "**a**"

7- Select the third button on the Template palettes, then choose the subscript symbol and type **1**.
8- Choose Update from the File menu, then choose Exit and Return from the same list.

The equation now should look like this: $y=a_1+bx$

Example 1 Use Word *Equation Editor* to write the following equation:

$$y = \sqrt[3]{\frac{1}{x}}$$

1- Open the Equation Editor as explained earlier
2- Type in **y=**
3- Choose $\sqrt[\square]{\square}$ from the template palettes
4- Choose $\frac{\square}{\square}$ from the template palettes
5- Type in **1** , then press **TAB** key
6- Type in **x** , then press **TAB** key twice
7- Type in **3** , then press **TAB** key
8- Choose Update from the File menu, then select Exit and Return from the same menu.

Example 2 Write the following equation:

$$\sum_{i=0}^{10} 2x_i^3$$

l- Open the Equation Editor
2- Select $\sum_{\square}^{\square}$ from the template palettes
3- Type in : **2x**
4- Select sub- and super-script from the template palettes.
5- Type in: **i** , then press the **TAB** key
6- Type in: **3** , then press the **TAB** key twice
7- Type in: **i=0** , then press the **TAB** key
8- Type in: **10** , then press the **TAB** key
9- Choose Update from the File menu, then select Exit and Return from the same menu.

Inserting Symbols You can insert symbols within the text without using the *Equation Editor*. For example, to write the equation $x \le \theta$, do the following:

1- Type in : **x**
2- Go to Insert > Symbol.
3- From the Font menu, choose Symbol.
4- Choose the ≤ character, then click on Insert to have it inserted after *x*.
5- Do the same for the θ character, then choose the whole equation and make it *italic*.

Bullets and Numbering You can have lists numbered or bulleted according to your desired style:

1- Open the Word document you wrote in the previous lab (Word Exercise # 1).
2- Highlight and copy the four lines starting from *To: All GE 204 Students*.
3- Paste the lines into this experiment's document. Highlight the new lines.
4- Go to Format > Bullets and Numbering
5- Choose your desired listing style (numbers, bullets), then click on OK.

KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
GE 204 - COMPUTER APPLICATIONS IN ENGINEERING

Microsoft Excel

Excel Exercise # 1

Objectives: Typing, editing and formatting in Excel; using functions and equations.

1. Start Excel by double-clicking on the Excel program icon (a new workbook will be opened, the title of this workbook is shown at the top of the window as *Bookl*.)
2. Practice moving inside the worksheet using the **ARROW KEYS** and the mouse.
3. Enter the data given below in the range **Al:J8**

Name	Quiz 1	Quiz 2	Exam 1	Exam 2	H.W.	Avg.	Final	Total	Grade
	(10)	(10)	(100)	(100)	(10)	(50)	(50)	(100)	
Mohamad Saad	10	9	84	90	8		43		
Saleh Ahmad	6	8	71	65	9		29		
Ali Mosa	8	9	81	83	6		40		
Khalid Nasir	10	9	98	91	9		46		
SUM.									
AVG.									

(Note: to write the brackets (like *(10)*), type **DASH (')** like: **'(10)**)

4. Change the contents of the cell **A5** to be **Ali Musa**.
5. Copy the contents of the cells in the range **C1:C6** to the cells in the range **D9:D15**
   - Select the cells in the range **C1:C6**.
   - Choose the Copy command from the Edit menu (the copy area will be marked.with a moving border).
   - Select the cell **D9**.
   - Choose the Paste command from the Edit menu (the contents of the cells in the range C1:C5 will be copied in the range **D9:D15**).
6. Move the contents of the cells in the range **D9:D15** to the cells in the range **F10:F16**
   - Select the cells in the range **D9:D15**.
   - Choose the Cut command from the Edit menu (the cut area will be marked with a moving border).
   - Select the cell **F10**.
   - Choose the Paste command from the Edit menu (the contents of the cells in the range **D9:D15** will be moved to the cells in the range **F10:F16**)
7. Erase the contents of the cells in the range **F10:F16**
   - Select the cells in the range **F10:F16**.
   - Choose the Clear command from the Edit menu. Choose the Contents command from the sub-menu (the contents of the cells in the range **F10:F16** will be cleared.)
8. Change the widths of column **A** to fit its contents
   - Move the active cell to cell which contains the longest content (i.e., cell **A3**).
   - Choose the Column command from the Format menu.

- Choose the AutoFit command from the sub-menu (the width of column **A** will automatically change to fit the longest content.)
- Students should experiment with changing column widths and row heights to get famliar with changing tables dimensions through Excel.

9. Add borders to your table
   - Select the cells in the range **A1:J8**.
   - Choose the Cells command from the Format menu, and click the Border tab.
   - Choose the border types so that the final table looks like the following:

Name	Quiz 1 (10)	Quiz 2 (10)	Exam 1 (100)	Exam 2 (100)	H.W. (10)	Avg. (50)	Final (50)	Total (100)	Grade
Mohamad Saad	10	9	84	90	8		43		
Saleh Ahmad	6	8	71	65	9		29		
Ali Musa	8	9	81	83	6		40		
Khalid Nasir	10	9	98	91	9		46		
SUM.									
AVG.									

10. Change the font type and size of the headings to: "Bold, 11 points"
    - Select the cells in the range **A1:J2**.
    - Click on the Bold button in the Toolbar.
    - Click the "Font Size" button in the Toolbar, and choose the 11 point size.
11. Center the contents of columns **B** to **J**
    - Select the cells in the range **B1:J8**.
    - Click the "Center Justification" button in the Toolbar.
12. lnsert four rows at the top of your table
    - Select the cells in the range **A1:A4**.
    - Choose the Rows command from the Insert menu (four rows will be inserted at the top of your table.)
13. Insert one column at the left of your table
    - Move the active cell to **A1**.
    - Choose the Columns command from the Insert menu (one column will be inserted at the left of your table.)
14. Enter the following header for your data table:

Grade Listing of Students

- Move the active cell to **C2**.
- Change the font to: Tahoma, **Bold**, 14 points.
- Enter the Text: **Grade Listing of Students**.

15. Enter today's date below the table header
    - Move the active cell to **D3**.
    - Change the font to: Tahoma, **Bold**, 11 points.
    - Enter today's date (e.g., **25-Jan-04**).

Your worksheet should look like the following:

Grade Listing Of Students

25-Jan-04

Name	Quiz 1 (10)	Quiz 2 (10)	Exam 1 (100)	Exam 2 (100)	H.W. (10)	Avg. (50)	Final (50)	Total (100)	Grade
Mohamad Saad	10	9	84	90	8		43		
Saleh Ahmad	6	8	71	65	9		29		
Ali Musa	8	9	81	83	6		40		
Khalid Nasir	10	9	98	91	9		46		
SUM.									
AVG.									

16. Calculate the average mark (Avg) of each student using the following equation:

$$\text{Avg.} = \text{Best Quiz} + \frac{\text{Exam 1} + \text{Exam 2}}{2} \times 0.3 + \text{H.W.}$$

- In cell **H7**, enter the formula:**=MAX(C7:D7) + (E7+F7)/2*0.3 + G7**
- Copy the contents of cell **H7** to the cells in the range **H8:H10** (notice that the formula is copied with the *relative* addresses).

17. Calculate the total mark (Total) for each student: Total = Avg + Final.
    - In cell **J7**, enter the formula: **= H7 + I7**
    - Copy the contents of cell **J7** to the cells in the range **J8:J10**. (Notice that the formula is copied with the *relative* addresses).
18. Calculate the summation (SUM) of all the entries in the columns,
    - Move the active cell to **C11**.
    - Click the AutoSum button. The following function will be displayed: *=SUM(C7:C10)*.
    - Press **ENTER**, and the value of the summation will be displayed.
    - Copy the contents of cell **C11** to the cells in the range **D11:J11** (notice that the formula is copied with the *relative* addresses).
19. Calculate the average (AVG) of all the entries in the columns,
    - In cell **C12**, write: **=AVERAGE(C7:C10)**
    - Copy the contents of cell **C12** to the cells in the range **D12:J12** (notice that the formula is copied with the *relative* addresses).
20. Find the grade (Grade) for each student, using the following criteria:

If	Total < 60,	then the Grade is F.
If	60 ≤ Total < 70,	then the Grade is D.
If	70 ≤ Total < 80,	then the Grade is C.
If	80 ≤ Total < 90,	then the Grade is B.
If	90 ≤ Total	then the Grade is A.

- Move the active cell to **K7**.
- Click the Function Wizard button on the standard Toolbar.

- In the Function Wizard dialog box, choose the IF function from the list of "Function Names". Keep in mind that an IF function looks like the following:
  IF (logical_test, value_if_true , value_if_false)

- Click the Next button.
- In the Step 2 dialog box, enter **J7<60** in the **logical_test** area and **F** in the **value_if_true** area.
- For the **value_if_false** area, type **Pass**, then press OK.
- Now you have entered an IF statement that checks if cell **J7** is less than 60; if it is true (i.e. **J7** is less than 60), then *F* will be displayed in cell **K7**, otherwise (i.e. if **J7** is larger than or equal to 60), the cell **K7** will instead display *Pass*.
- To complete the formula, replace the "*Pass*" written in the **value_if_false** area with the following nested IF functions:
  IF(J7<70,"D",IF(J7<80,"C",IF(J7<90,"B","A"))).

The full formula should be:

IF(J7<60, "F",IF(J7<70,"D",IF(J7<80,"C",IF(J7<90,"B","A"))))

- Copy the contents of cell **K7** to the cells in the range **K8:K10** (notice that the formula is copied with the *relative* addresses).

Your final worksheet should look like the following:

Grade Listing Of Students

25-Jan-04

Name	Quiz 1 (10)	Quiz 2 (10)	Exam 1 (100)	Exam 2 (100)	H.W. (10)	Avg. (50)	Final (50)	Total (100)	Grade
Mohamad Saad	10	9	84	90	8	44.1	43	87.1	B
Saleh Ahmad	6	8	71	65	9	37.4	29	66.4	D
Ali Musa	8	9	81	83	6	39.6	40	79.6	C
Khalid Nasir	10	9	98	91	9	47.35	46	93.35	A
SUM.	34	35	334	329	32	168.45	158	326.45	
AVG.	8.5	8.75	83.5	82.25	8	42.1125	39.5	81.612	

You can format the numbers so that the table shows only one decimal fraction; go to Format then Cells, choose the Number tab, and from the Category list choose *Number*, then choose *1* as the number of decimal places to be displayed on screen.

21. Save your workbook
- Choose the Save command from the File menu (the Save As dialog box will appear).
- Choose the appropriate drive and directory, (e.g., a:\).
- Type a file name for your workbook (e.g. *excel1*), and then click the OK button.

22. To print your work:

a) Set-up the page

- Choose the Page Setup From the File menu (the Page Setup dialog box will appear.)

- Select the Margins tab.
- Select the Horizontally and Vertically check boxes (this will center the data on the page.)
- Select the Sheet tab.
- Clear the *Gridlines* check box (this will hide the gridlines when printing.)
- In the *Print Area* box, enter: **A1:M20** (this will specify a worksheet range to print.)
- Click the OK button.

b) Preview what will print

- Choose the Print Preview command from the File menu.
- Look at your work and make sure it is OK.
- Click the Close button.

c) Print your worksheet

- Choose the Print command from the File menu.
- Click the Selection check box, and then click the OK button. (Your worksheet will be sent to the printer.)

KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
GE 204 - COMPUTER APPLICATIONS IN ENGINEERING

Microsoft Excel

Excel Exercise # 2

Objectives: Filling tables, chart drawing.

1. Start Excel.
2. Write the following table using the same formatting (borders, centering, bold table heading) shown starting from cell **A1**:

x	f(x)	g(x)
-180		
-135		
.	.	.
.	.	.
.	.	.
.	.	.
180		

To fill column **A** with the values shown, do the following:

- Type **-180** in cell **A2**
- Type **-135** in cell **A3**, then choose cells **A2** and **A3**, and copy their contents to **A10** (another method: type **-180** in cell **A2**, type the equation **= A2 + 45** in **A3**, then copy equation to cell **A10**).

3. To calculate the values of *f(x)* and *g(x)*, use the following equations:

$$f(x) = \sin(x)$$
$$g(x) = \cos(x)$$

Do the following:

- Type the following in cell **B2** : **= sin (A2 * PI( ) / 180)** ← *Why?*
- Copy the equation to cell **B10**.
- Type the following in cell **C2** : **= cos (A2 * PI( ) / 180)**
- Copy the equation to cell **C10**.
- Change the number display by choosing cells **B2:C10** and go to Format > Cells, and choose the Number tab. From the Category list, choose Number, and set two decimal places.

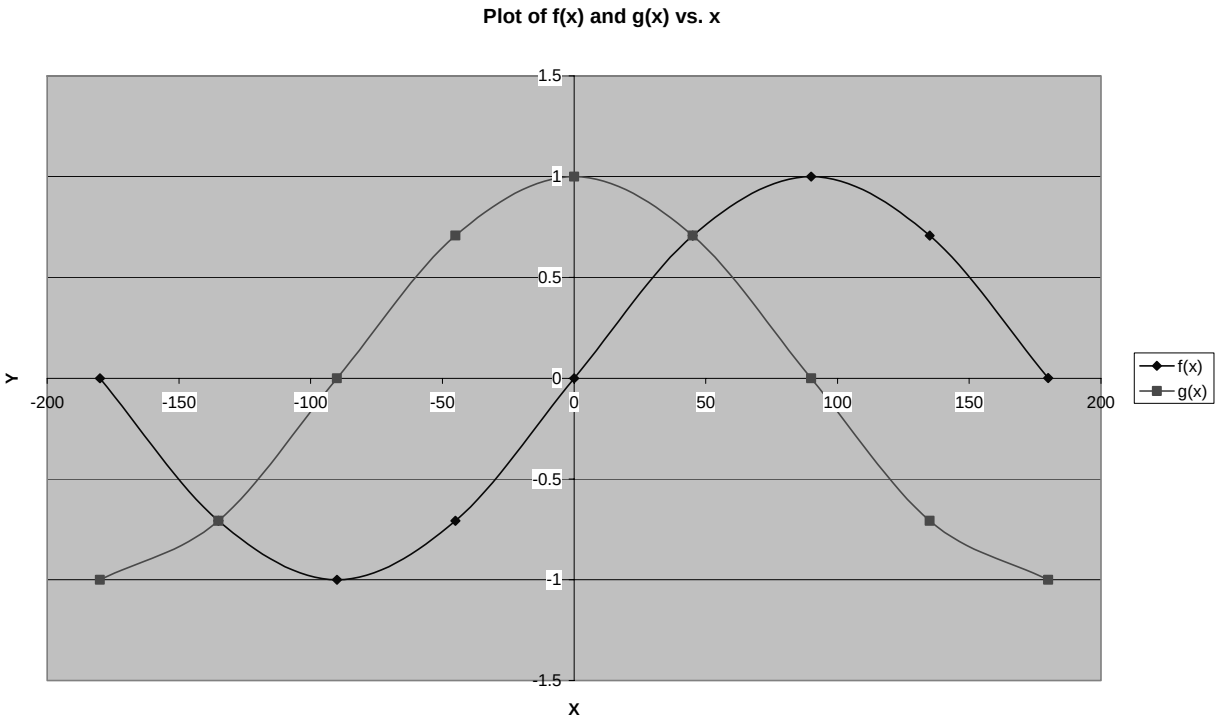
4. Create an embedded line chart for the given data.

- Select the cells in the range **A1:C10**.
- Choose the Chart command from the Insert menu
- In the Chart Wizard dialog box (Step 1 of 4), select the chart type as *XY (scatter)*, chart *sub-type 2*, then click the Next button.
- In Step 2 of 4 dialog box, verify the data selection, and choose the Data Series in Columns. Delete the series ***x***. Click the Next button.

- In Step 3 of 4 dialog box, type: **Plot of f(x) and g(x) vs. x** for the chart title, "**X**" for the x-axis title, and "**Y**" for the y-axis title.
- In Step 4 of 4 dialog box, choose to display the chart in the same worksheet. Click the Finish button.

4. Resize the chart to cover the cells in the range **A12:I30**
   - Click the chart to select it (the chart will be enclosed in a box with a thin-line border.)
   - Move the mouse pointer to the upper-left corner of the box until it changes to an inclined line with double arrows.
   - By clicking the mouse and holding it, move the box-corner to the upper left corner of cell **A12**.
   - Move the mouse pointer to the lower-right corner of the box until it changes to an inclined line with double arrows.
   - By clicking the mouse and holding it, move the box-corner to the lower right corner of cell **I30**.

Your chart should look like the following:



Try changing the graph (axis scale, type, fonts, colors, gridlines … etc).

5. Save your Workbook, using the Save As command and the following:

   - Drive: A:\
   - Save As File Type: Microsoft Excel Workbook
   - File Name: *excel2*

KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
GE 204 - COMPUTER APPLICATIONS IN ENGINEERING

Mathworks Matlab

Matlab Exercise # 1

Objectives: defining and using variables, basic mathematical operations, operator precedence, basic functions.

1. Start *Matlab* by clicking on the Matlab icon. Type the following command at the command window after inserting your disk in the floppy drive (A:):

```
>> cd a:
>> diary output.txt
```

This command will be explained at the end of this experiment.

2. To define variable *a* with value 9, type:

```
>> a = 9
```

3. To change the value of *a* to 5, type:

```
>> a = 5;
```
(note the semicolon)

Why didn't *Matlab* display the change? To display variable a value, type:

```
>> a
```

4. Next, we will define variable *b* with value 2:

```
>> b = 2
```

5. Try the following mathematical operations, and check the result:

```
>> a+b
>> A-b
```
(what is wrong with this command?)
```
>> a-b
>> a*b
>> a/b
>> a\b
```
(what is the difference between \ and /?)

Note that if an operation was made with its output not assigned to any variable (e.g. `a+b` instead of `c=a+b`), the variable `ans` will store the result.

6. Next we will assign the result of the following operation to variable c:

```
>> c=a^b
```

7. For the following operation, try to find the order of calculation:

```
>> c-a/b
```
(how do we change precedence?)

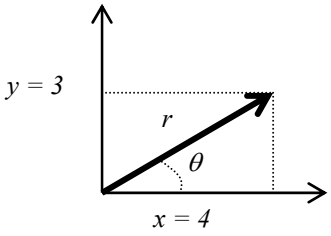
8. Next, we will use some available functions in Matlab. To calculate $\sqrt{-4}$, type:

```
>> sqrt(-4)
```

What is the meaning of the result?

9. In the following steps, we will find the magnitude *r* and angle θ for $x = 4$ and $y = 3$. First, we will define the values of *x* and y:

```
>> x=4; y=3;
```



To find *r*, type:

```
>> r = sqrt(x^2+y^2)
```

To find θ, type:

```
>> theta = atan(y/x)*180/pi
```
(explain the meaning of the equation)

If the opposite operation is required (i.e. convert from polar to rectangular), what equations are needed?

10. For the next step, define a 3×1 array (i.e. vector) called *f* by typing:

```
>> f=[-0.5 0.1 0.5]
```
(typing `f=[-0.5,0.1,0.5]` *gives the same result)*

Then type:

```
>> f(2)
>> f(1)
```

What is displayed by these commands? More array commands will be covered in the next experiment.

11. Type the following commands while noting the difference in their results:

```
>> round(f)
```
(rounds to nearest integer)
```
>> fix(f)
```
(rounds towards 0)
```
>> ceil(f)
```
(rounds to nearest integer towards ∞)
```
>> floor(f)
```
(rounds to nearest integer towards - ∞)
```
>> find(f>=0)
```
(lists indices of elements in $f \geq 0$)

12. To understand the syntax and operation of any function, type:

```
>> help functionname
```

For example, to use the `sin` (sine) function, type:

```
>> help sin
```

To use it to find the sine of angle 90°, type:

```
>> sin(90*pi/180)
```

Can you find a function that converts from degree to radian? (hint: use `lookfor` command)

13. Read the description of the following *Matlab* functions and experiment with them: `exp`, `log`, `abs`.

14. Now type:

```
>> diary off
```

The `>> diary output.txt` command entered at the beginning of this experiment stored the output of this session to a text file called *output.txt* (in the folder *work* within the *Matlab* folder). You can then print the file for the session results.

15. Finally type the following command to exit *Matlab* when done:

```
>> exit
```

Exercise:

Calculate the following through Matlab:

a. $a1 = \sin^2 30^\circ + \cos^2 45^\circ$

b. $b1 = 3\dfrac{\sqrt{5}-1}{\left(\sqrt{5}+1\right)^2} - 1$

c. $c1 = e^{\pi\sqrt{163}}$

d. $d1 = \ln e^3$

e. $e1 = \dfrac{2^5}{2^5-1} \cdot \left(1 - \dfrac{1}{2^5}\right)$

KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
GE 204 - COMPUTER APPLICATIONS IN ENGINEERING

Mathworks Matlab

Matlab Exercise # 2

Objectives: array definition, array operations, array manipulation, solution of linear and nonlinear equations, polynomials and roots.

1. Start *Matlab*. Then define arrays $A=\begin{bmatrix}9 & 6\\ 1 & 1\end{bmatrix}$ and $B=\begin{bmatrix}5 & 6\\ 2 & 3\end{bmatrix}$ through *Matlab* by typing:

```
>> A=[9 6;1 1], B=[5 6;2 3]
```

2. Execute the following operations:

```
>> size(A)
>> length(A)          (what is the difference between length and size?)
>> A+B
>> A-B
>> A*B
>> A/B
>> inv(A)
>> det(A)
>> transpose(A)       (or A')
>> A.*B               (what is the difference with A*B?)
>> A^2                (what is the difference with A.^2?)
```

3. To check a particular matrix element, for example the element in row 2 column 2 of matrix *B*, type:

```
>> B(2,2)
```

To change it to 5, type:

```
>> B(2,2)=5
```

4. To show the second row of array *A*, type:

```
>> A(2,:)
```

What should be typed to display the first column of *B*?

5. Next, find the sum of the rows of array *A* by typing:

```
>> sum(A)
```

To find the sum of all elements of *A*, type:

```
>> sum(sum(A))
```

Also note that functions can be applied to matrices (e.g. `sin`, `exp`, `abs`…). Type:

```
>> sin(A)
```

6. Type the following commands, while noting what each one does:

```
>> eye(3)
>> zeros(3,2)
>> ones(3)
>> diag(A)
>> triu(A)
>> tril(A)
```

7. To create an array *C* of size 2×4 that contains the elements of both *A* and *B*, type:

```
>> C=[A B]
```

8. Solve the following system of linear equations:

$$\mathbf{2}\,x + y - \mathbf{4}\,z = \mathbf{5}$$
$$x - \mathbf{2}\,y - \mathbf{5}\,z = -\mathbf{6.5}$$
$$y + \mathbf{2}\,z = \mathbf{4}$$

One possible solution is by computing the inverse of the matrix of coefficients:
To do this exercise follow these steps:

a. In matrix form, the above equations can be written as:

$$\begin{bmatrix} 2 & 1 & -4 \\ 1 & -2 & -5 \\ 0 & 1 & 2 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 5 \\ -6.5 \\ 4 \end{bmatrix}$$

b. Define the matrix *D* and the vector *M* shown below using the same method used in step 1:

$$D = \begin{bmatrix} 2 & 1 & -4 \\ 1 & -2 & -5 \\ 0 & 1 & 2 \end{bmatrix} \qquad M = \begin{bmatrix} 5 \\ -6.5 \\ 4 \end{bmatrix}$$

c. Multiply the inverse of the matrix *D* by the vector *M* by typing

```
>> inv(D)*M
```

d. The resulting vector contains the values of *x*, *y*, and *z*.

9. Solve the following non-linear equations:

$$\boldsymbol{x\,y = 5}$$
$$\boldsymbol{x - y = 0.5}$$

To solve these equations through *Matlab*, type:

```
>> [x,y] = solve('x*y=5','x-y=0.5')
```

10. Next, we will find the roots of the polynomial $x^2 - 5x + 6$. To find it, type the following:

```
>> p=[1 -5 6];              (to define polynomial coefficients)
>> roots(p)                 (or just type: roots([1 -5 6])
```

11. To find the polynomial equation with roots 4 and -2, type the following:

```
>> r=[4 -2];
>> poly(r)                  (or just type: poly([4 -2])
```

12. To add two different polynomials x^2+4x+4 and $x^3-6x^2+11x-6$, type:

```
>> a=[0 1 4 4];             (the zero is required to have the same size)
>> b=[1 -6 11 -6];
>> a+b
```

13. To multiply the two polynomials x^2+4x+4 and $x^3-6x^2+11x-6$, type:

```
>> a=[1 4 4];               (zero not required here)
>> b=[1 -6 11 -6];
>> conv(a,b)
```

To divide, use the `deconv` command.

14. To derive the polynomial $x^3-6x^2+11x-6$ (which we defined in the previous step as *b*) type:

```
>> polyder(b)
```

Exercise:

a. *Generate array i=1,* $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \ldots, \frac{1}{100}$.

b. *Generate array j, where its elements are the even numbers between 24 and 75.*

c. *Define array* $A = \begin{bmatrix} 9 & 5 & 2 \\ 3 & 8 & 3 \\ 1 & 2 & 7 \end{bmatrix}$, *then change the element* $A_{3,2}$ *to -3.5.*

d. *Generate two arrays k=1,2,…,10 and l=2,4,…,20, then find m =* $\sum_{i=1}^{10} k_i \cdot l_i$

KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
GE 204 - COMPUTER APPLICATIONS IN ENGINEERING

Mathworks Matlab

Matlab Exercise # 3

Objectives: Plotting commands in Matlab.

1. Define a vector *c* that starts from -10 to 10, with an increment of 0.5 (total 41 points). It can be generated using one of two commands. Complete them:

```
>> c = … : … : …          or     >> c = linspace( … , … , … )
```

2. Type the commands that calculate the values of *a* and *b*, where:

$$a = c^2$$
$$b = c^3$$

3. To plot *a* against *c*, type:

```
>> plot(c,a)
```

Now try the following:

```
>> plot(c,a,'go')
```
(What is the effect of 'go'*?)*

4. To plot *a* and *b* with respect to *c* , type:

```
>> plot(c,a,c,b)
```
*(*a *against* c*,* b *against* c*)*

Notice that this new plot overrides the previous one.

5. Use the `help` command to find out how to draw *a* using black diamonds and *b* using red stars and dashed line.

6. Type the following to add to your graph:

```
>> title('A and B vs. C')
>> xlabel('C')
>> gtext('A')                    (place next to A curve)
>> gtext('B')                    (place next to B curve)
>> grid
```

7. To start a new figure, type:

```
>> figure(2)
```

To plot on the first figure, just type `>> figure(1)` before using any `plot` command.

8. In figure 2, we will draw *a* vs. *c*, and *b* vs. *c* in separate diagrams. To draw the first part, type:

```
>> subplot(2,1,1)
```

What is the meaning of these numbers? Use the `help` command to find out more about the `subplot` command.

9. To switch to the second part of figure 2, type:

```
>> subplot(2,1,2)
```

Then plot *b* vs. *c*. You can save the figure by clicking on the save icon.

10. Repeat the previous experiment steps to draw *d* and *e* vs. *f*, with *f* = -5, -4.8, -4.6,…, 4.8, 5, *d* = *cos(f)* and *e* = *sin(f)*.

11. Type the following commands:

```
>> figure(3)
>> p=round(10*rand(100,1))
```

(what does this command do?)

To find the histogram of *p*, type: `>> hist(p)`

12. Type and execute the following commands:

```
>> t=linspace(0,6*pi,100);
>> x=cos(t);y=sin(t);z=t;
>> subplot(2,2,1)
>> plot3(x,y,z),grid
>> xlabel('cos(t)'),ylabel('sin(t)'),zlabel('t')
>> subplot(2,2,2)
>> plot(x,y)
>> xlabel('cos(t)'),ylabel('sin(t)')
>> subplot(2,2,3)
>> plot(x,z),xlabel('cos(t)'),ylabel('t')
>> subplot(2,2,4)
>> plot(y,z),xlabel('sin(t)'),ylabel('t')
```

What can you deduce from the previous commands?

13. Experiment with the following commands: `hold`, `bar`, `pie`.

Exercise:

Calculate the following functions for $0 \le t \le 10\pi$ *(with step = 0.1):*

$$f(t) = t \cdot \sin t$$

$$g(t) = t \cdot \cos t$$

Plot the following on the same figure:

i. graph 1: f(t) and g(t) versus t (i.e. t in x-axis, f(t) and g(t) in y-axis).
ii. graph 2: g(t) vs. f(t).

For graph 1:

1. *Draw f(t) in red X, and g(t) in blue O*
2. *Label the x-axis* `'t'`*, and the y-axis* `'f(t) and g(t)'`
3. *Title the graph* `'f(t) and g(t) vs. t'`
4. *Display legend information and gridlines on the graph*

For graph 2:

1. *Draw the plot using a green line*
2. *Label the x-axis* `'f(t)'`*, and the y-axis* `'g(t)'`
3. *Title the graph* `'g(t) vs. f(t)'`

KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
GE 204 - COMPUTER APPLICATIONS IN ENGINEERING

Mathworks Matlab

Matlab Exercise # 4

Objectives: workspaces (managing, saving, loading), number display formats, script M-files (writing, running), functions.

1. Define some variables by typing the following:

```
>> var1= 15.3; var2=-9.2; var3=55.5;
```

2. To list the workspace variables, type:

```
>> who
```
(for more details, type `whos`*)*

3. To delete a variable (for example *var3*) from the *Matlab* workspace, type:

```
>> clear var3
```
(to clear all variables, type `clear`*)*

Type `who` to check whether *var3* is still in the workspace.

4. The default number display format in *Matlab* is short (5 digits). To preview it, display the value of π by typing:

```
>> pi
```

To change the number display type, simply type `format type`. The following table lists some of the available types:

Matlab Command	π	Comments
`format short`	`3.1416`	5 digits
`format long`	`3.1459265358979`	16 digits
`format short e`	`3.1416e+00`	5 digits plus exponent
`format long e`	`3.141592653589793e+00`	16 digits plus exponent
`format short g`	`3.1416`	best of `short` or `short e`
`format long g`	`3.1459265358979`	best of `long` or `long e`

5. After experimenting with the number display formats, save the workspace information so that all variable information can be retrieved later. Type:

```
>> cd a:                (to transfer to drive a:, make sure your disk is inserted)
>> save ge204
```

The command saves the workspace information as file *ge204.mat* in the work folder (type `pwd` to check where is your work folder). You can later load the variables and continue your work. Test this by exiting *Matlab*, then starting the program again and typing `load ge204`.

6. For writing long *Matlab* commands, it is preferable to write them in a script file (an M-file) instead of the command window. The file will be named *matlabexp3_1* (note the underscore). Either choose File > New > M-File or type:

```
>> edit script1 (or type edit, then save as script1 in A:)
```

7. Type the following in the edit window:

```
disp('This is a test script M-file')
a=4;
b=6;
c=input('Enter value of c > ');

f = 3*a + 2*b^3 + c/5
```

8. After saving the file, run it by typing the following at the command window:

```
>> script1
```

Find out what was executed through the M-file. What are the `disp` and `input` commands?

9. Next, type the following commands in a script file called *script2*:

```
x = 0:2*pi/N:2*pi;
y = sin(w*x);
plot(x,y)
```

Note there are two variables (`N,w`) which are not yet defined in this file. After saving the M-file, type the following in the command window:

```
>> N=100; w=5;
>> script2
>> x
>> y                    (did Matlab recognize these two variables?)
```

Because variables `N` and `w` were defined in the workspace by the first step, the script file `script2` ran with no problems. What would happen if `N` and `w` were not defined?

10. Script files are very useful for executing several commands without having to type them each time. Functions, however, offer more power by giving the ability to write your own *Matlab* functions, thus using them many times in any script file. Create a new M-file called *function1*, and type the following commands:

```
% This part becomes the help text when you type help exp3fun
% This function has two inputs: 1st N, 2nd w
```

```
function y=function1(N,w)
x = 0:2*pi/N:2*pi;
y = sin(w*x);
plot(x,y)
```

Save the file, then type the following:

```
>> clear              (to clear all variables from the workspace)
>> function1          (why is there an error?)
>> function1(100,5)
>> function1(200,10)       (several input values can be used with functions)
>> help exp3fun
>> x
>> y                  (why didn't Matlab recognize x or y inside function1?)
```

Exercise:

Write a function called `exercise_4` *that solves N linear equations Ax= B by multiplying* A^{-1} *into B. The function has two inputs and two outputs:*

a. *The first input is matrix A, while the second input is matrix B*
b. *The first output is |A|, while the second output is the solution of the linear equations*
c. *Write a clear help description for the function (test by typing* `>> help exercise_4`*)*

Use the function to solve the following set of linear equations:

$$x + y - 2 = -2z$$
$$3x + z = y + 6$$
$$x + 3y + 4z - 4 = 0$$

KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
GE 204 - COMPUTER APPLICATIONS IN ENGINEERING

Mathworks Matlab

Matlab Exercise # 5

Objectives: looping commands, symbolic calculation, Simulink.

Flow Control commands

1. The `if` command is a conditional command that can be used in *Matlab* in more complex programs. Type the following:

```
>> a=3;
>> if a>1
a=a+10;
end
>> a
```

Repeat the same steps after changing the value of a to -5.

2. The `for` command allows execution of commands for a certain number of times. Type the following commands using the command prompt:

```
>> for j=1:4
disp(j)                    (or just type j)
end
```

What does this `for` command do?

Try the following program:

```
>> v = 1:3:10
>> for j=1:4
v(j) = j;
end
>> v
```

Explain the new value of *v*. Is it easier to just write `>> v=1:4` ?

3. The `while` command repeats commands while its condition is true. Type the following:

```
>> i=9;
>> while i>1
i=i-1
end
```

Repeat the previous steps with the condition changed to `i<1`? Also repeat the previous steps replacing `i=i-1` with `i=i+1`. Explain the difference.

Symbolic Calculation

4. Simplify the following equation $cos^2(\alpha) + sin^2(\alpha)$. First, define α as a symbolic variable:

```
>> syms alpha
```

Then type the equation:

```
>> z = sin(alpha)^2 + cos(alpha)^2;
```

To simplify it, type:

```
>> simplify(z)
```

5. To derive the function $f(x) = x^3 - cos(x)$, type the following commands:

```
>> syms x              (define variable x as symbolic)
>> f=x^3-cos(x)
>> g=diff(f)
```

If there is more than one variable in the function (e.g. $z = 5x^2+10xy$), type:

```
>> syms y                    (x is already defined from the previous step)
>> z=5*x^2+10*x*y
>> diff(z,x)                 (for differentiating z wrt x)
>> diff(z,y)                 (for differentiating z wrt y)
```

6. To integrate equation *f* defined in step 4, type:

```
>> int(f)
```

Similarly, to integrate equation *z* for a variable (e.g. *x*), type:

```
>> int(z,x)
```

7. Another method for calculating function's roots is by through the following (assuming the polynomial is $x^2 - 5x + 6$):

```
>> syms x
>> f=x^2-5*x+6
>> solve(f,x)
```

8. Try the following commands:

```
>> pretty(x^2)
```

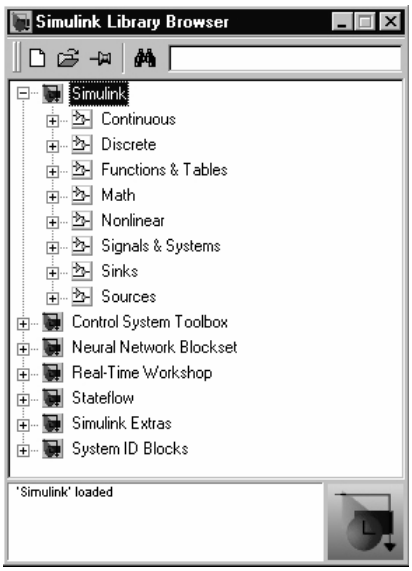
```
>> expand((x+y)^3)
```

Simulink

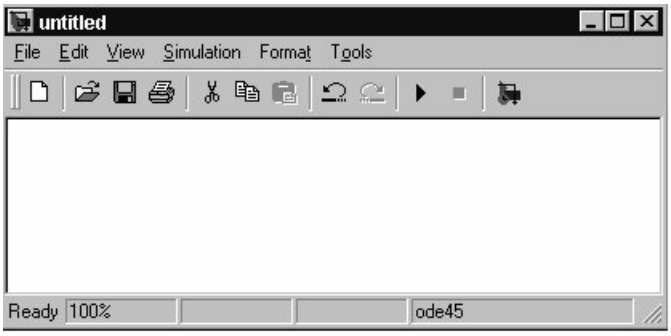
9. Start *Simulink* by typing:

```
>> simulink
```

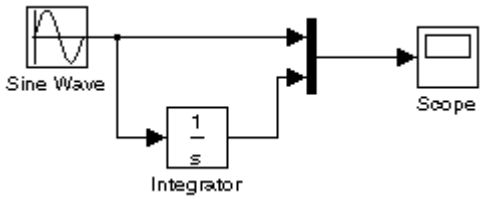
The Simulink Library Browser window, similar to the following screenshot, should appear:



It contains many blocks that are categorized into groups and sub-groups. Click on the New icon, and a new model window will appear:



10. A simple Simulink model will be created of the following system:

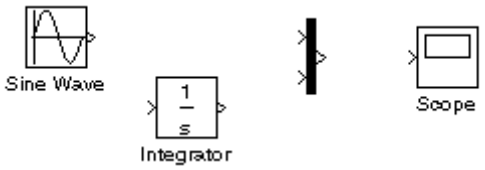


To build the system, choose the following blocks by dragging them to the blank sheet:

1. Sinks library ➔ Scope block
2. Sources library ➔ Sine Wave block

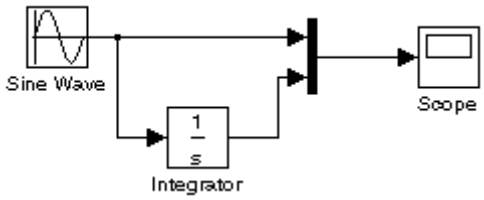
3. Continuous library ➔ Integrator block
4. Signal Routing library ➔ Mux block

After dragging all the required blocks, you should have the following screen:



11. The next step is to connect the blocks. Each block has input(s) and output(s). To connect, just click on the output of one block, drag the mouse to the input of the next block (cursor changes to double-lined crosshairs), then release the mouse button (or just click on the two blocks while holding **CTRL**). To connect the integrator, click on the Sine Wave-Mux connection while holding **CTRL**, then drag to the integrator input (or start the connection from the Integrator input).

The final model connection should look like the following figure:



12. Now set up *Simulink* to run the simulation for 20 seconds. First, open the Configuration Parameters dialog box by choosing Configuration Parameters from the Simulation menu. On the dialog box that appears, notice that the Stop time is set to 10.0 (its default value). Press OK when done.

13. Before starting the simulation, double-click on the scope. Start the simulation by choosing Start from the Simulation menu.

14. If desired, you can save the *Simulink* model before exiting.

Exercise:

a. Write a script m-file called ***ex5*** *that uses the Matlab function* `rand` *to generate a 1-D array of 100 elements (x) of random numbers, and then finds the values of array y according to the following relationship:*

$$y(i) = \begin{cases} 0.1 & \text{if } x(i) < 0.3 \\ 0.4 & \text{if } 0.3 < x(i) < 0.7 \\ 0.9 & \text{if } x(i) > 0.7 \end{cases}$$

b.: i. Calculate $\frac{d}{dx}\left(4x^3 + 5y^2\right)$ *ii. Expand* $(a-b)^4$

King Saud University

COLLEGE OF ENGINEERING

GE 204

COMPUTER APPLICATIONS IN ENGINEERING

Lab Homework

KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
COMPUTER APPLICATION IN ENGINEERING (GE204)
Homework form 1 (Hardware and Windows)

الاسم : _____ الرقم: _____

1. Solve the following:

1. A CD-ROM has a capacity of:
   a. 650 KB
   b. 650 MB
   c. 650 GB
   d. 1.44 MB

2. CPU stands for:
   a. Central Processing Unit
   b. Computer Processing Unit
   c. Computer Power Utility
   d. None of the above

3. Which of the following is considered an input device?
   a. Printer
   b. CPU
   c. RAM
   d. Keyboard

4. CPU speed is measured in:
   a. MHz
   b. MB
   c. KB
   d. Kilograms

5. Windows is:
   a. An operating system
   b. A computer
   c. An application
   d. None of the above

6. Which of the following is not a printer type?
   a. Laser
   b. Gas
   c. Dot-matrix
   d. Ink

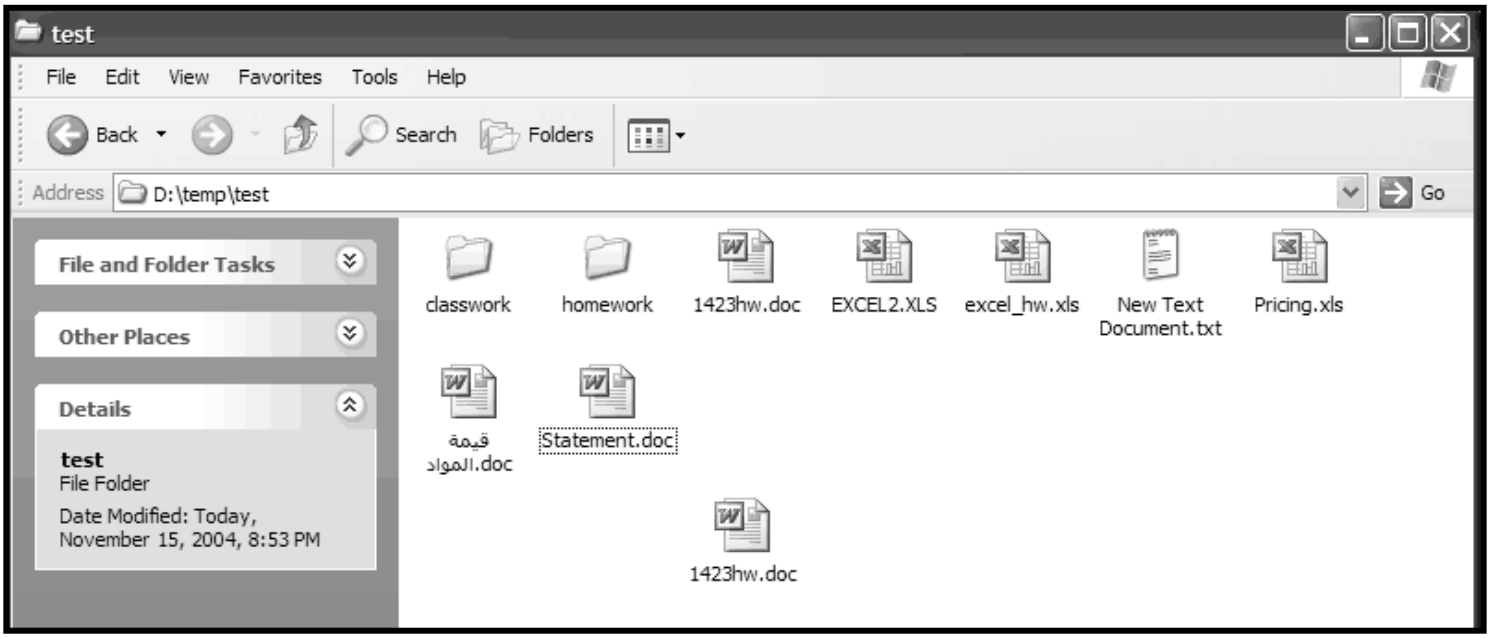
7. The file extension for Word documents is:
   a. JPG
   b. DOC
   c. TXT
   d. EXE

8. RAM size is measured in:
   a. KB
   b. GB
   c. MB
   d. MHz

9. If a file is deleted in Windows, it is:
   a. Put into a floppy disk
   b. Moved to the Recycle Bin
   c. Put into My Computer
   d. Transferred to My Documents

10. The key used to write all letters in CAPITAL is:
    a. Alt key
    b. Caps Lock key
    c. Insert key
    d. F1 key

2. From the following screenshot, answer the following questions:



a. **How many folders are there? How many files?**

b. **What is the current folder (name and location)? At what drive is it on?**

c. **How many Excel workbooks are in this folder?**

d. **Write the extension of the file 'New Text Document'. What type is it?**

e. **There is a mistake in the screenshot, what is it and why?**

KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
COMPUTER APPLICATION IN ENGINEERING (GE204)
Homework form 2 (Hardware and Windows)

الرقم:..... الاسم : .....

1. In which of the following can you view the hierarchy of drives folder, and files in split pane Window?

   A The Windows Explorer window
   B The Programs window
   C The My Computer window
   D The WordPad window

2. For most Windows Programs, the **Save As** command is located on which menu?

   A File
   B Edit
   C Help
   D Save

3. To prepare a floppy disk to receive your files; you must first do which of the following?

   A Copy work files to the disk
   B Format the disk
   C Place the files on the Clipboard
   D Erase all the files that might be on the disk

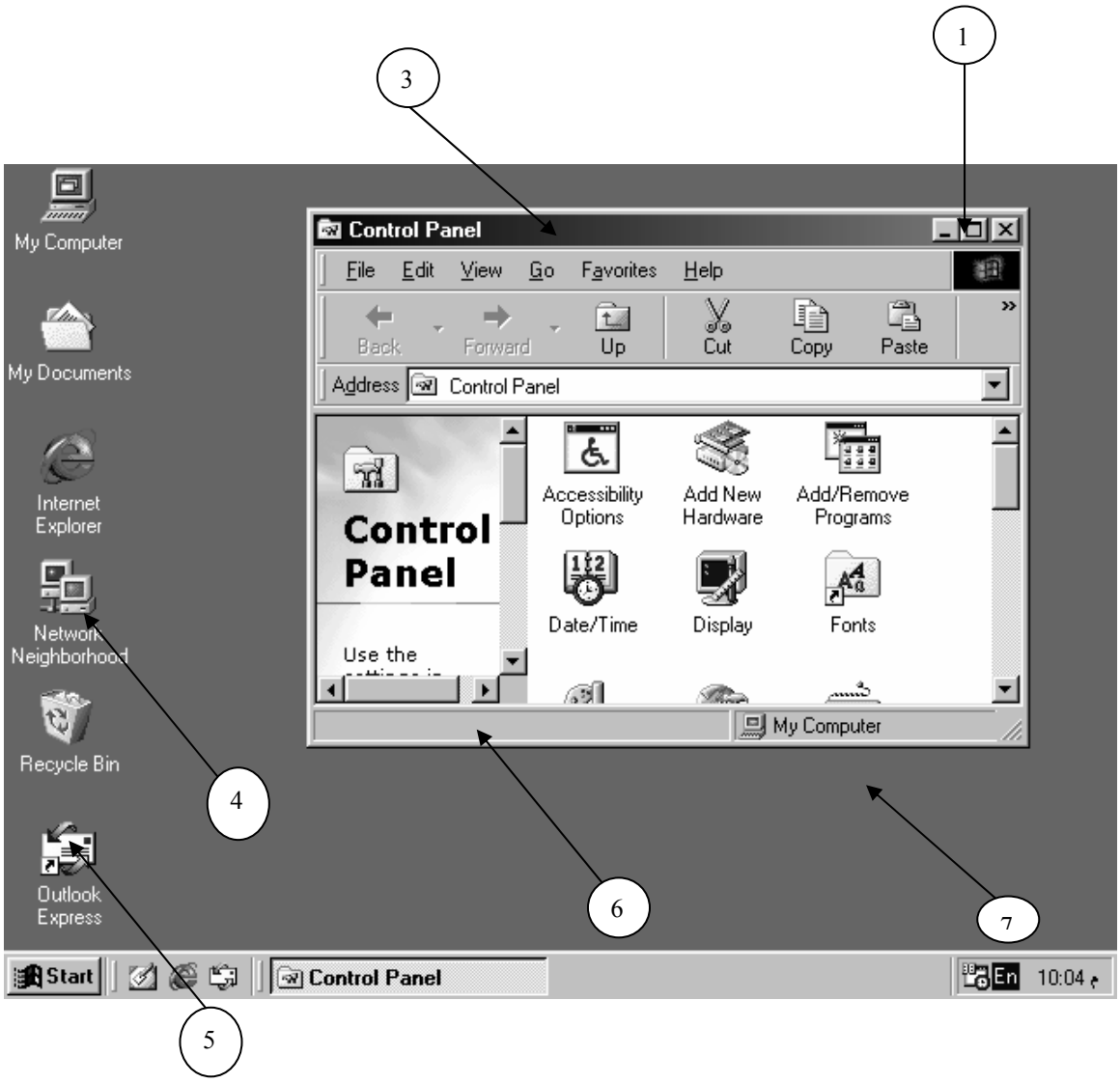
4. To view the contents of a folder, you can use which of the following tools?

   A The Desktop
   B Windows Explorer
   C My Computer
   D Either b or c

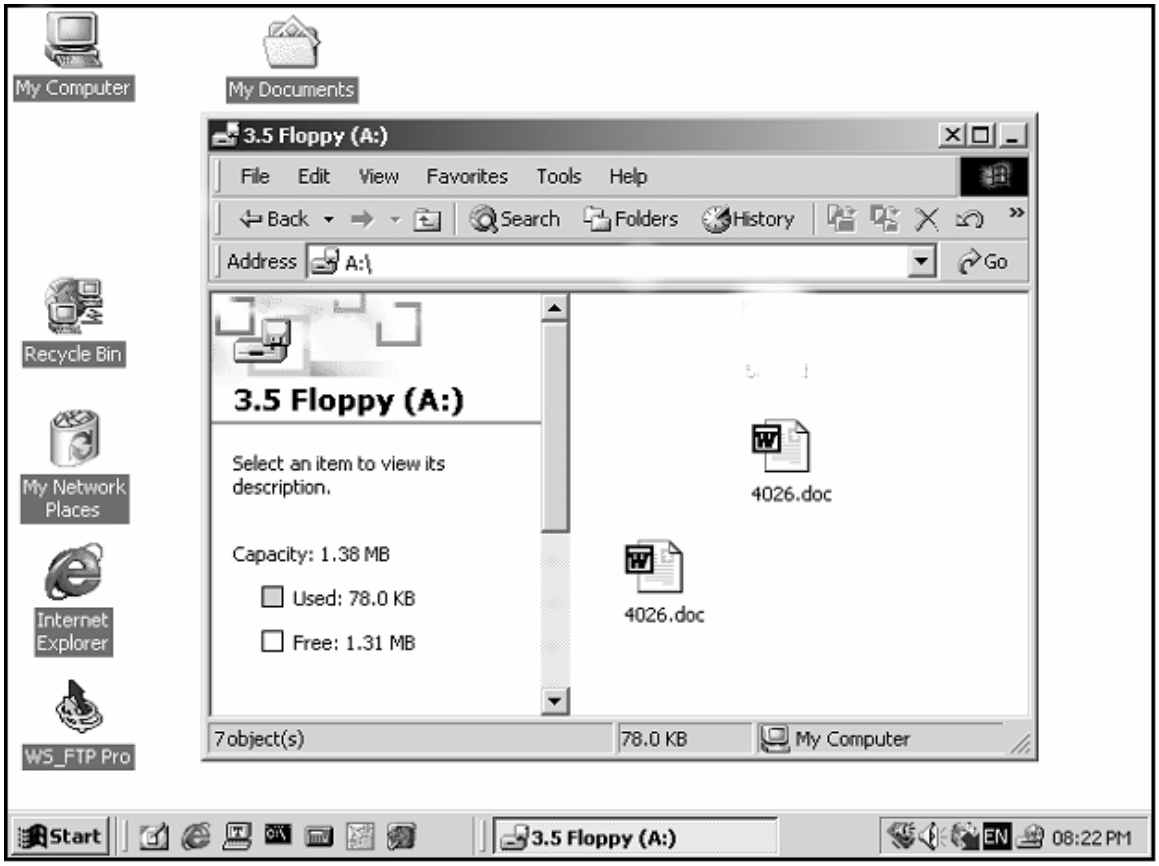
5. While you are working in a Program, where is your work stored?

   A On hard drive
   B In RAM
   C In the monitor
   D On the Clipboard

2. Write the definitions of the items numbered in this window



3. Mark and explain the errors in the following desktop shot.



KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
COMPUTER APPLICATION IN ENGINEERING (GE204)
Homework form 1 (Word)

Write the following document using the Arial font, size 12, unless specified using grey shading. Page margin setup should be left=right=1", top=bottom=1.1". Submit both a softcopy and hardcopy of your solution.

My Name :
My Univ. No. :
My Computer No. :

COMPUTER

Computer equipment is called hardware. Hardware includes parts of a computer that you can touch and fix with tools. Input devices are example of hardware.

Computer programs are called software, consists of instructions to tell the computer what to do. MS Word is the most well known word processing program. 1.5 line spacing

The text could be **bold**, *italic*, underline, subscript X_2 or superscript X^5 & symbols Ω . There are also **different fonts and font sizes** Tahoma/14 to write the text.

- Microsoft Word can e used to write equations such as: -

$$f = \int_{-\infty}^{\infty} \omega^2 \quad \sum_{n=1}^{10} \quad \frac{X_1^n}{X_1^{n+1}} \quad d\omega \qquad \textbf{Eqn 1.5}$$

- It can also be used to draw any desired tables such as: -

Table 1.1

Student Grades		
Number	**Total**	**Grade**
422000000	85	B+
422000001	41	F

KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
COMPUTER APPLICATION IN ENGINEERING (GE204)
Homework form 2 (Word)

Write the following document with the same formats below. You MUST perform the requirements listed in the document, plus the following:

1. *Type using **Courier New; font size 12.***
2. *Both sides should be **justified.***
3. *Line spacing **1.5** for the **second** paragraph and **single** for others.*
4. *For table use **Column Width 3.5 cm**, **Row Height is 0.5 cm**, **text in center of the cells.***
5. *Print the document and submit it with the diskette (use student number for file name).*

Name : **Your Full Name** Student No.: **Student No**

Computer **(font size 16)**

Computer equipment is called hardware. Hardware includes the parts of a computer you can touch or fix with tools. Input devices are example of hardware.

Computer program tell the computer what to do. They are called software. Software consists of instructions that tell the computer what to do. These software programs are divided into Word Processing; Electronic Spreadsheets; Equation Solver; Communicating and networking.

You can use word processing to write a text, a table or equations. The text can be written **bold**, ***italic***, **underline** subscript (X_2) or superscript (X^4). There is also **different font and font size** **(Times New Roman 16)** to write the text.

$$Y = \int_{-\infty}^{\infty} \omega^2 \sum_{n=1}^{10} \frac{X_1^n}{X_1^{n+1}} \, d\omega$$

Student grades		
Student NO.	**Total**	**Grade**
421000000	80	B
421000001	65	D

KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
COMPUTER APPLICATION IN ENGINEERING (GE204)
Homework form 1 (Excel)

Question 1:

1. Write your **Name** in Cell **A2**, your **Student No.** In Cell **B2**.
2. Starting From Cell **B4,** Generate the following table exactly:
3. In Column **G**, write a formula to get the **Total** for each student, where,

$$\text{Total} = \begin{cases} 0.4 \text{ of the best test} + 0.65 * \text{Final} & \text{IF HW is Good} \\ 0.4 \text{ of the best test} + 0.55 * \text{Final} & \text{IF HW is Bad} \end{cases}$$

4. In Cell **C10** write a formula to get the **Minimum grade** for each tests, and totals.

Student	Test 1	Test 2	Finals	HW	Total (Integer)
1	80	86	90	GOOD	
2	90	88	75	GOOD	
3	65	20	75	BAD	
4	77	82	45	BAD	
5	98	90	92	GOOD	
MIN					

Question 2: Let the variable **X** varies from **0 to 360** in step of **12**. The functions F(X) and G(X) are given by:

F(X) = 5*cos(X)
G(X) = 3*sin(X)

Make a table of **X (Degrees), X (Radians), F(X),** and **G(X)** as shown below:

X (Degrees)	X (Radians)	F(X)	G(X)

Draw a **Single XY Chart** (**Subtype** *3*) **as New Sheet** for **F(X)** and **G(X)** as a function of **X (Degrees)** with the following requirements:

- Chart titles: **SINE & COSINE** (**Arial, 14 Point**)
- X – axis title: **Angle - Degrees** (**Time New Roman, Bold**)
- Y- axis title: **SIN & COS** (**Time New Roman, italic**)
- Location of legend: **Top – right corner of chart**
- Number Format: must be **2** decimal places after the integer (e.g.: 0.87 instead of 0.866025)

Save your work on drive **A:** with file name '*******' which represents your student number.

KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
COMPUTER APPLICATION IN ENGINEERING (GE204)
Home work form 2 (Excel)

الرقم: الاسم :

Question 1:

1. Write your **Name** in Cell **A2**, Your **Student No**. In Cell **B2**.
2. Starting From Cell **B4,** Generate the following table exactly:
3. In Column **G**, write a formula to get the **Total** for each student, where,

$$\text{Total} = \begin{cases} 0.4 \text{ of best test} + 0.65 * \text{Final} & \text{IF HW is Good} \\ 0.4 \text{ of best test} + 0.55 * \text{Final} & \text{IF HW is Bad} \end{cases}$$

4. In Cell **C10** write a formula to get the **Minimum grade** for each tests, and totals.

Student	Test 1	Test 2	Finals	*HWS*	Totals (Integer)
1	80	86	90	GOOD	
2	90	88	75	BAD	
3	65	20	75	GOOD	
4	77	82	45	BAD	
5	98	90	92	GOOD	
MIN					

Question 2:*Let the variable* ***x*** *varies from* ***1 to 20*** *in* ***step*** *of* ***1****. The function F(X) is defined as follows:*

$$F(x) = \begin{cases} X & 0 \le X < 5 \\ 10 - X & 5 \le X < 10 \\ X - 10 & 10 \le X < 15 \\ 20 - X & 15 \le X < 20 \\ 0 & 20 \le X \end{cases}$$

Make a table of *X* and *F(X)*, as shown below:

X	F (X)
1	
2	

Draw a chart with the following characteristics on a new sheet:

Chart type XY (scatter) chart subtype 2	Chart title Your Student ID - Times New Roman, 20 Point	X – axis title,**Time**, 16 point, bold
Y-axis title Amplitude - 12 Point and italic	Legend F (x), bottom -Left side	Line for f (x), solid, circles
NO Grid lines	Plot area- shading none, no border	Format X – axis Max = 12, major unit= 3, minor unit = 1

KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
COMPUTER APPLICATION IN ENGINEERING (GE204)
Homework (Matlab)

For Q1 and Q2, print the output of the diary command (as in Matlab Experiment 1). For Q3, print the m-files. For Q4, print the graph. Submit both a softcopy and hardcopy of your solution.

1. Compute the following:

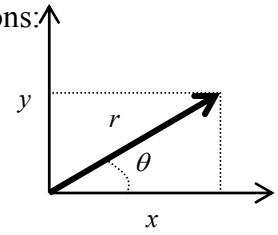
a) e^{π} b) $\ln_2 16$ c) $|100 - 950|$

d) sin(45°) e) $10 \log_{10} 4$ f) $3\frac{\sqrt{5}-1}{(\sqrt{5}+1)^2} - 1$

2. Create the following matrix: $A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$

   a. Create a 2 × 3 array *B* consisting of all the elements in the second and third columns of *A*
   b. Create a 2 × 2 array *D* consisting of all elements in the first two rows and the last two columns of *A*
   c. Find |A|
   d. Find A^T
   e. Replace the element on row 2, column 2 to 15

3. The location of a point in a certain plane can be expressed in either the rectangular coordinates (*x,y*), or the polar coordinates (r,θ), as shown in the figure. The relation ships between these two sets of coordinates are given by the following equations:



Cartesian ➔ polar: $r = \sqrt{x^2 + y^2}$ $\theta = \tan^{-1}\frac{y}{x}$

polar ➔ Cartesian: $x = r\cos\theta$ $y = r\sin\theta$

   a. Write a script m-file that converts a location on the Cartesian plane expressed in rectangular coordinates into the corresponding polar coordinates, with angle θ expressed in degrees. Name the script file `rect2polar`. Write comments.

   b. Write a function m-file that converts polar coordinates to rectangular coordinates. The input angle θ should be in degrees. Name your function with `polar2rect`. Write comments.

```
function [x,y] = polar2rect(r,theta)
```

4. Plot $y = \cos x$ and $z = 1 - \frac{x^2}{2} + \frac{x^4}{24}$ for $0 \le x \le \pi$, taking 100 points on the same graph. Label the x-axis with X and y-axis with Y, put ***your student number*** as title for the plot, and make sure grid is on.