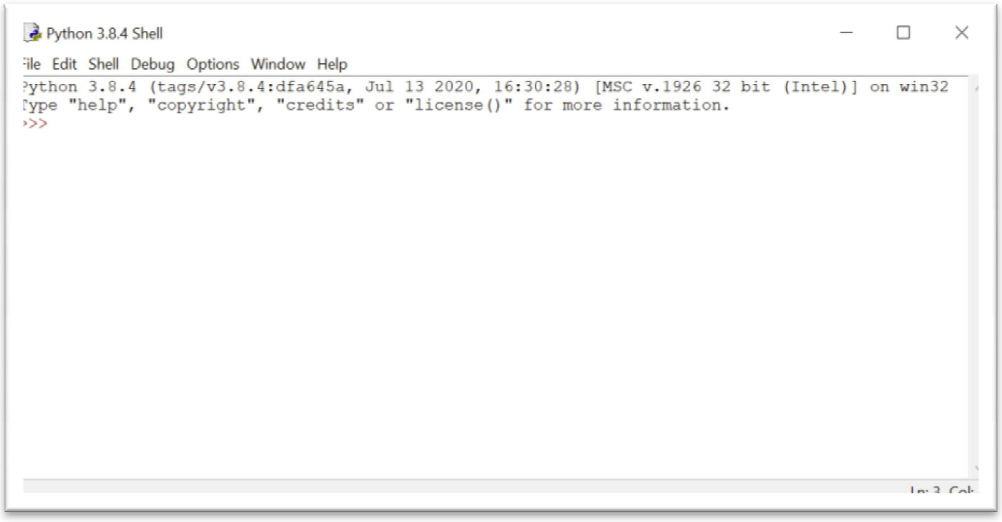
1st practical work

All students are invited to do the following :

- Install the latest version of Python 3 on your computer: https://www.python.org/downloads/windows/
  Run the Installer

- Open **IDLE**, Python's built-in **I**ntegrated **D**evelopment and **L**earning **E**nvironment.
  1-Click the Start menu and locate the Python folder.
  2- Open the folder and select IDLE



Write a Python Program

IDLE's interactive window contains a **Python shell**, which is a textual user interface used to interact with the Python language. You can type a bit of Python code into the interactive window and press Enter to immediately see the results.

The >>> symbol in the last line is called the **prompt**. This is where you'll write your code

Note : for a program (a set of instructions) in python Idle : click: ***file--New***. if you want to run your program click : ***Run -- Run Module*** from the menu in editor window.

1- Comments:

Comments are used to explain the code and are ignored by the Python interpreter. You can use the # symbol for single-line comments.

```
>>> # Nothing to do , it's just a comment                    # .....................
```

2- Shell as a calculator

a) Type and explain the result of these operations?

```
>>> 5 + 2          # .....
>>> 10 - 2         # .....
>>> 6 * 2          # .....
>>> 8 / 3          # .....
>>> 10 // 3        # .....
>>> 5 % 2          # .....
>>> 5 ** 2         # .....
>>> 9 ** 0.5       # .....
>>> 5 and 0        # .....
>>> 1 or 1         # .....
>>> (5 + 1 * 3) +2 # .....
>>> 5 + 3 ** 2 * 2 # .....
>>> 5 + 3 +*2 * 2  # .....
>>> 5 + 3 ** 2 / 0 # .....
```

b) Command Print .

To print strings to console or echo some data to console output, use Python inbuilt print() function. ***Type and explain the result ?***

```
>>> print('hello world')                          # .....
>>> print ('5 + 3 ** 2 ' , 5 + 3 ** 2)            # .....
>>> print ('5 + 3 ** 2 ' , 5 + 3 ** 2, sep = '=') # .....
>>> print('hello world', end='.')                  # .....
>>> print('hello', end='\n' ); print('world', end='.')  # .....
```

what is the role of semi colon(;)?

3- built-in Functions:

some bultin functions in python. Type the following and explain each result ?

```
>>> abs(-1.5)              # .....
>>> bin(24)                # .....
>>> chr(65) ;ord('m')      # .....
>>> chr(ord('m')+1)        # .....
>>> chr(ord('B')-1)        # .....
>>> str(65)                # .....
>>> min([-1.5,2,3.1,10,12])  # .....
>>> max([-1.5,2,3.1,10,12])  # .....
>>> sum([-1.5,2,3.1,10,12])  # .....
>>> format(0.000152,'E')     # .....
>>> format(0. 152,'%')       # .....
>>> int(3.41)                # .....
```

3- Using the editor : Type, save and run this program. What does this program do?

```
import time
seconds = 10
while seconds > 0:
        print(f"Time remaining: {seconds} seconds")
        time.sleep(1)  # Delay for 1 second
        seconds -= 1

print("Time's up!")
```

Primitives Variables

In Python, **variables** are names that can be assigned and store (in memory) a value and then used to refer to that value throughout your code.

Python variables do not need explicit declaration to reserve memory space. The declaration happens automatically when you assign a value to a variable. The equal sign (=) is used to assign values to variables.

1- Create variables : ***Give the answer of the following :***

- Create a variable named **Var1** and assign the value **"Hello"** to it
  .....
- Create a variable named **X1** and assign the **Real value 2** to it
  .....
- explain the purpose of ***type*** function using this command : ***type(2.5)***
  .....
- x = 5 ; print (x)
  .....
- x = 5 ; print(x , type (x) , sep = ' is type of ')
  .....
- z , x = 5 , 0 ; print(z , ' ' ,x)
  .....
- x = int (20) ; print (type (x))
  .....
- y = 20.5 ; print (y , type (y), sep = ' is type of ')
  .....
- y = float (20.5) ; print (y , type (y), sep = ' is type of ')
  .....
- S= "Hello, World" ; print (S , type (S), sep = ' is type of ')
  .....
- L= True ; print (L , type (L), sep = ' is type of ')
  .....
- L = str ("True") ; print (type (L))
  .....
- a=10 ; b= a + 2; c = a + b ; print (a , b, c, sep=' '))
  .....
- a=10 ; a= a + 1; print (a)
  .....
- a=5; b=10 ; c=3; b+=1 ; c**=2; a-=1;print (a, b, c, sep =(' '))
  .....
- a=5; b=10 ; c=a; a =b ; b = c ; print ('a become ', a , ' and b = ', b)
  .....
- a = 8.5; b =1.2 ; a = a + b; b = a-b ; a = a - b; print ('a become ', a , ' and b = ', b)
  .....
- a = 6; b =(a+3)*2 ; a = a + b+4; b = (b+2)*3 ; print ('a = ', a , ' and b = ', b)
  .....

Python Basic Input and Output

In Python, we use the **print()** function to output data to the screen. Sometimes we might want to take input from the user. We can do so by using the **input()** function.

Note : Python takes all the input as a string input by default.

1- Give the outputs of the following instructions:

- print(1, 1, 2024, sep='/', end='.')
  .....
- x = 3 ; y = 12; mul = x * y ; print('The value of x is {} and y is {}'.format(x, y))
  .....
- print('{2} is the multiplication of {0} and {1}'.format(x, y, mul))
  .....
- add = x + y ; print("The new number after addition is %d" % add)
  .....
- sub = x - y ; print(f' The new number after subtraction is {sub} ')
  .....
- name = input("Enter your first name: ") ;
  .....
- age = **int** (input ("Enter your age: ")); n = age + 1; print (name + " your age will be next year! " , n)
  .....
- S1,S2 = input ("Enter two values separated by space character").split(); print(" S1= " , S1, " S2= ",S2)
  .....

Writing scripts:

Use the editor provided by (you can use any third party python IDE) to write the following scripts:

1. Write a python script that takes two variables as input then exchanges their values . Example: when a = 2 and b = 5, the script will give a = 5 and b = 2.

2. Write a script that receives two **integers**, then writes their sum and their difference

3. Write the Cylinder program, which calculates and displays the volume of a cylinder after entering its radius R and its height H.

4. Write a program that calculates and displays the absolute value of a real number x entered by the user (use the built-in function abs(x)).

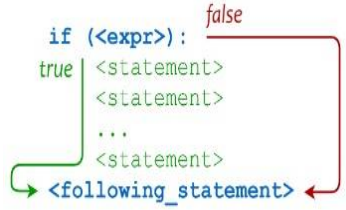
Python Conditions and If .. elif ... else statements

Condition: Python supports the usual logical conditions from mathematics (== , != , >, <= , >=, <) .
Note : we can create more complex logical conditions. We can use the logical "AND" (**and**), logical "OR" (**or**), logical negation (**not**) and brackets (**( )**).

Construct the truth table for the following expressions:

- a = 2; b = 6; print (((a == b) or (a != b)) and (b >= a)) .....
- print (not ((a != b) and (a == b) or (b >= a))) .....

If , elif , else statements: *here is the complete syntax with examples*




```
if Condition:
    STATEMENT1
else:
    STATEMENT2
```

```
if Condition1:
    STATEMENT1
elif: Condition2:
    STATEMENT2
else:
    STATEMENT3
```

Type and conclude?

```
a=float(input('a=  '))

if a > 0:
  print('a is positive')
```

```
a=float(input('a=  '))
if a > 0:
  print('a is positive')
else:
  print('a is <= 0 ')
```

```
a=float(input('a=  '))
if a > 0:
  print('a is positive')
elif a=0:
  print('a is null ')
else
  print('a is Negative ')
```

Writing scripts:

5. Write a script that asks the user for two real numbers and then informs them if their product is negative , positive or null. you should not calculate the product of the two numbers
6. Write a Python program that determines whether a given number (accepted from the user) is even or odd, and prints an appropriate message to the user
7. rewrite the script in -4- without using the built-in function
8. Write a program that makes it possible to discern a mention for a student based on the average mark of their grades:
   - “Very good” for an average mark between 16 and 20 (16<= average <=20).
   - "Good" for an average mark between 14 and 16 (14<= average <16).
   - “Fairly good” for an average mark between 12 and 14 (12<= average <14).
   - “Fair” for an average mark between 10 and 12 (10<= average <12)
9. Write a script that input two real numbers and calculates their sum if they are both positive or the product if they are both negative.
10. Residents of a given city pay tax according to the following rules:
    - men over 20 pay tax
    - women pay tax if they are between 18 and 35 years old
    - the others do not pay tax

    Write a script that asks for the age and gender (‘M’ or ‘W’) of a resident and displays whether they are taxable.
11. Write a script called CALCULATOR, which reads in this order:
    1- The first real.
    2- Arithmetic operator (+, -, *, /).
    3- The second real.

    Each valid operator corresponds to a calculation that should be performed and display result or an error message, if not applicable