

**Thank srivatsan**

**I am new so I may make some mistakes. But I assure you that I will try my best**

**start with a question about how many know what level of python and what they can do**

**Aim of this tutorials is to make you comfortable with python. If all goes good and you all put some efforts I believe you will be able to play with the dataset of your final project**

**Show diagraame 1 and diagram 2**

**Why Python?**

**Open Anaconda and open Jupyter. Explain why Spyder is not good for this course**

**Why Jupyter**

What is Jupyter and what is Spyder?

Jupyter: Line by line compilation, command line interface is really good, showcase your work as a data scientist

- 1) type in some commands and print some outputs
- 2) Tell some features of Jupyter

Spyder: Mostly for programmers, Its not line by line compiler, It has 3-4 views which are required for programming

We will use Jupyter for our data science purpose as it is more user friendly  
Explain How Jupyter works

A program is a sequence of instructions that specifies how to perform a computation. The computation might be something mathematical, such as solving a system of equations or finding the roots of a polynomial, but it can also be a symbolic computation, such as searching and replacing text in a document or (strangely enough) compiling a program.

## **Our First Programe**

```
In [8]: print('Hello World!')
```

```
Hello World!
```

```
In [9]: print("Hi")
```

```
Hi
```

```
In [10]: print ('Hello # world')
```

```
Hello # world
```

```
In [11]: print ("hello # world")
```

```
hello # world
```

```
In [4]: 2 + 3
```

```
Out[4]: 5
```

```
In [38]: print('Hello', 'world!')
```

```
Hello world!
```

```
In [1]: Print('Python, whats 1 + 2')
```

```
-----  
NameError                                Traceback (most recent call last)  
<ipython-input-1-b89864e8338d> in <module>()  
----> 1 Print('Python, whats 1 + 2')  
  
NameError: name 'Print' is not defined
```

So make sure you write print in small and not Print

### Show Library image and clothes image and to explain scalar objects

- 1) for us  $2+2$  and  $2.000000 + 2.000000$  are same, but for computer they are not
- 2) Computer save data in a way to optimize the space and computation
- 3) Therefore based on usability, we tell computer beforehand what type of number/character is that

scalar vs non scalar objects:  
scalar objects are independent and they do not have internal structure. They are atomic objects  
non-scalar objects have internal structure with set of atomic elements.

## Scalar Objects

Python stores different object differently based on the use.

Show pictures and talk.

for us  $2+2$  and  $2.0000000001 + 2.0000000001$  are same. But for computer, they are not! Every zero that we add, it adds a bit of memory and complexes the computation.

So we tell the datatype to computer beforehand.

So 3 basic data types are integer, float and boolean.

1)int is used for integers e.g. 1, 0, 1000, 5000  
like no of children, no of cars, etc.

2)float is used to represent real numbers e.g. 3.0, 4.0, 100.5, 3.14, 4e3 (4 times 10 to the power of 2) etc

3)boolean is used for binary like True and False.  
Pass or fail

4)There are some types like None, long integers which we talk about later

So what should be the data type of following variables?  
We want to design a demographic table. What data type would you assign  
Age, no of courses taken, Height , weight, Married/unmarried

```
In [13]: type(1)
```

```
Out[13]: int
```

```
In [14]: type(1.0)
```

```
Out[14]: float
```

```
In [2]: 4e2
```

```
Out[2]: 400.0
```

```
In [3]: type(4e4)
```

```
Out[3]: float
```

```
In [15]: 1==0
```

```
Out[15]: False
```

```
In [9]: type(1==1)
```

```
Out[9]: bool
```

```
In [19]: (3+2)==(1+4)
```

```
Out[19]: True
```

```
In [20]: ((3+2)==(1+4)) == (4%2==1)
```

```
Out[20]: False
```

```
In [16]: type(False)
```

```
Out[16]: bool
```

```
In [17]: type(True)
```

```
Out[17]: bool
```

```
In [6]: 4 + 5 == 6
```

```
Out[6]: False
```

```
In [5]: 2 + 3 ==5
```

```
Out[5]: True
```

```
In [1]: int(5.0)
```

```
Out[1]: 5
```

```
In [2]: float(5)
```

```
Out[2]: 5.0
```

```
In [3]: bool(5)
```

```
Out[3]: True
```

```
In [4]: bool(0)
```

```
Out[4]: False
```

```
In [5]: bool(1)
```

```
Out[5]: True
```

```
In [6]: int(5.8)
```

```
Out[6]: 5
```

## Operators

```
There are some basic data operators
+ plus
- minus
/ divide
* multiply
% remainder (I % j is pronounced as “i mod j”)
** power
< less- than
> greater- than
<= less- than- equal
>= greater- than- equal
```

```
In [18]: 2+3
```

```
Out[18]: 5
```

```
In [19]: 3-2
```

```
Out[19]: 1
```

```
In [20]: 3*2
```

```
Out[20]: 6
```

```
In [21]: 10/2
```

```
Out[21]: 5.0
```

```
In [22]: 11/2
```

```
Out[22]: 5.5
```

```
In [23]: int(11/2)
```

```
Out[23]: 5
```

```
In [24]: 35%4
```

```
Out[24]: 3
```

```
In [25]: 4**3
```

```
Out[25]: 64
```

```
In [26]: 5<2
```

```
Out[26]: False
```

```
In [27]: 5<5
```

```
Out[27]: False
```

```
In [28]: 5<=5
```

```
Out[28]: True
```

```
In [29]: print('what is 5 - 7?', 5 - 7)
```

```
what is 5 - 7? -2
```

```
In [7]: int(5) + float(3.2)
```

```
Out[7]: 8.2
```

## Variables and assignments

Variables provide a way to associate names with objects. These names, associated with objects can be used and called again and again, instead of objects.  
An assignment statement associates the name to the left of '=' to the object denoted by the expression to the right of '='.

Its like naming a perons.

```
In [30]: pi = 3.1416
```

```
In [31]: pi
```

```
Out[31]: 3.1416
```

```
In [32]: radius = 4  
area = pi*(radius**2)
```

```
In [33]: area
```

```
Out[33]: 50.2656
```

```
In [34]: my name = 'chinmay'
```

```
File "<ipython-input-34-dbe3d424d435>", line 1
    my name = 'chinmay'
        ^
SyntaxError: invalid syntax
```

```
In [35]: my_name = 'chinmay'
```

```
In [36]: my_name
```

```
Out[36]: 'chinmay'
```

```
In [39]: radius = 4
        pi = 3.1416
        area = pi * (radius**2)
```

```
In [41]: print('when radius of a circle is ' + str(radius) + ' units then area of circle is
```

```
when radius of a circle is 4 units then area of circle is 50.2656 square units
```

```
In [48]: print('when radius of a circle is %d units then area of circle is %f square units
```

```
when radius of a circle is 4 units then area of circle is 50.265600 square unit
s
```

```
In [7]: universities = '\nDuke \nstanford \nMIT \nCaltech'
        print('best universities in the world are:', universities )
```

```
best universities in the world are:
Duke
stanford
MIT
Caltech
```

```
Reserved Keywords: and, del, from, not, while, as, elif, global, or, with,
assert, else, if, pass, yield, break, except, import, print, class, exec, in,
raise, continue, finally, is, return, def, for, lambda, try
```

```
Readability of code:
a = 3.1416
```

```
pi = 3.1416
```

```
b = 4
c = a*(b**2)
Which code makes more sense?
```

```
radius = 4
area = pi*(r**2)
```

```
In [ ]: ##### Finding number is odd or even
```

```
odd_even = [1,2,3,4,5,6,7,8,9,10]
for num in odd_even:
    if num % 2 == 0:
        print ('%d is even' %num)
    elif num % 2 == 1:
        print ('%d is odd' %num)
```

```
In [10]: # Finding roots of Quadratic equation
# Assume that quadratic equation is of the form of  $Ax^2 + Bx + C = 0$ 
```

```
a = int(input('What is a?'))
b = int(input('What is b?'))
c = int(input('What is c?'))

d = (b**2) - (4*a*c )

root1 = (-b + d**0.5)/(2*a)
root2 = (-b - d**0.5)/(2*a)

print ('2 roots of quadratic equation are ' + str(root1) + ' & ' + str(root2))
```

```
What is a?1
What is b?10
What is c?25
2 roots of quadratic equation are -5.0 & -5.0
```



In [18]: *# A bit more sophisticated program*

```
a = int(input('What is a?'))
b = int(input('What is b?'))
c = int(input('What is c?'))

d = (b**2) - (4*a*c) # discriminant

if d < 0:
    print ("This equation has no real solution")
elif d == 0:
    x = (-b+ (d**0.5)) / (2*a)
    print ("This equation has one solutions: ", x)
else:
    x1 = (-b + (d**0.5))/2*a
    x2 = (-b - (d**0.5))/2*a
    print ("This equation has two solutions: ", x1, " and", x2)
```

What is a?3

What is b?4

What is c?5

This equation has no real solution