Munster Programming Training

What is Python?

Python is a programming language.

- It communicates to the computers what to do “line after line”.
- It interprets each line from the natural language to the computer language.
- It solves various problems from scientific to entertaining.

Why Python?

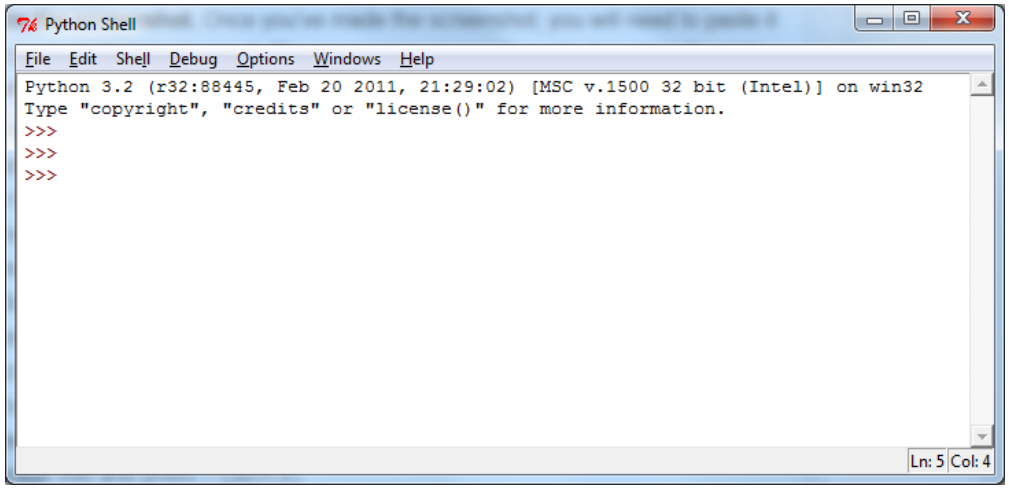
- It is simple, interpreted, procedural, object oriented etc.
- It has impact in several areas … internet, networking, etc
- It can be used to solve scientific problems.

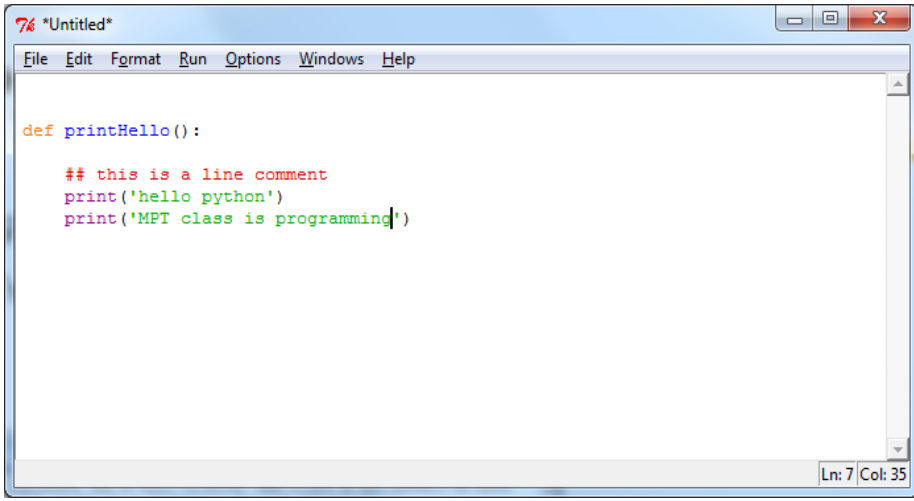
What is Python

GUI tool to develop and interpret Python modules.

Two different windows:

1. Interpreter windows for executions
2. Editing window for developing / writing modules





What is a Python Program?

Python programs are sequence of lines described in a “natural language”.

These lines include:

- Python comments
- Python key words e.g. def, import, if, for, range etc.
- Python identifiers (names) for variables, methods etc.
- Python values for numbers or text
- Python expressions

These lines are written with a certain semantics.

- One action / statement per line
- **Use of indentation**

Python Comments

Python comments are lines that are not interpreted / executed.

Comments are for ourselves to give information / explanation about the code.

```
# make a line comment
’ ’ ’ something in between these represents a block comment ’’’
```

A block comment at the beginning of a method generates documentation.

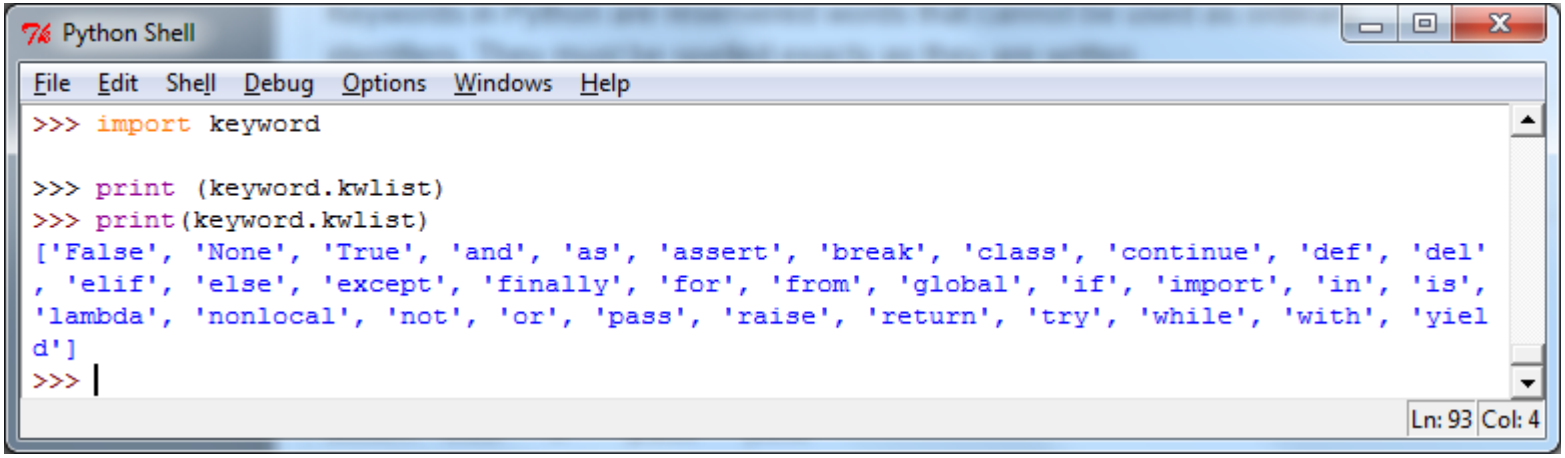
We can read it in the interpreter window as help.

Python Keywords

Keywords are reserved word for Python statements, datatypes etc.

- Data types: int, float, str, etc
- Statements: if, while, for, etc

These words cannot be used as user names / identifiers.



Python Identifiers

Identifiers are names for Python variables, functions, etc.

Rules to name an identifier:

- Use only letters and digits 0-9 and _
- Do not start with a digit
- Do not use Python Key words
- Python is case sensitive so pay attention to letter capitalisation

Golden rules

- Use meaningful names formed with multiple words.
- Start the first word with low case letter and any subsequent word with capital e.g. solveEquation, profitRate etc

Python Values

Values represent integer or real numbers, or text Python programs.

Values can be as follows:

- **int**(eger) - sequence of digits e.g. 100, 0, 123 etc
- **float** (real numbers) - sequence of digits with a decimal point e.g. 1.0, 1.23
- **str**(ing of characters) or text – sequence of characters between ’ ’

Python datatypes are int, float and str.

Values can be used in Python expressions.

Python int Expressions

Python int values are integers between -2147483648 to 2147483647.

Expressions use operators and brackets ().

int operators are as follows:

+, -, *, / for the main arithmetical operations

** for the exponent

// for the results of the integer division

% for the remainder of the integer division

Python float Expressions

Python float values are number with a decimal point.

Python float values are represented with “some exact decimals”.

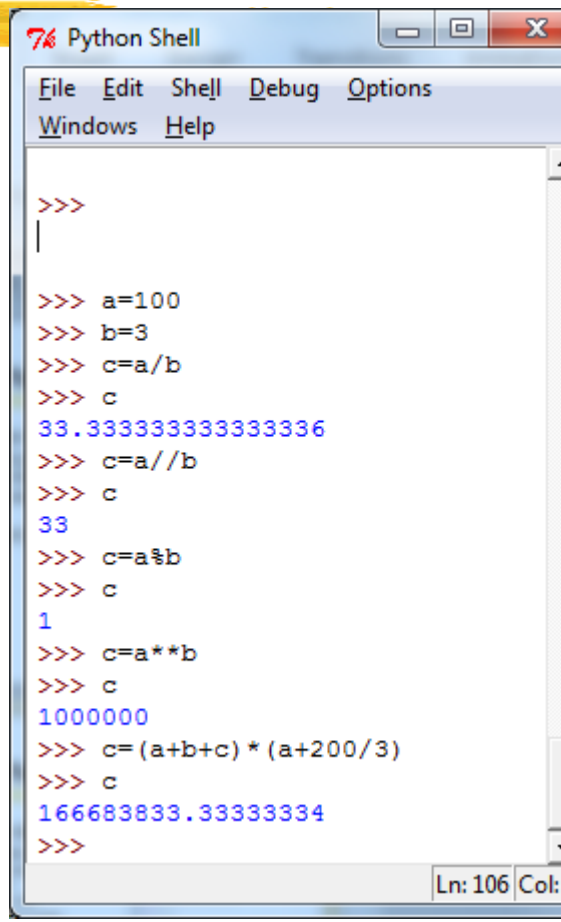
float operators are as follows:

+, -, *, / for the main arithmetical operations

** for the exponent

Example of Expressions

```
>>>a=100
>>>b=3          # What is the nature of a, b?
>>>c=a/b        # What is the nature of c?
>>>c=a//b       # What is the nature of c?
```



Variables

Variables are Python identifies which carry a value.

a, b, c are all variables.

Variables must be initialised / assign value before used.

Variable assignments:

var = value

var = expression

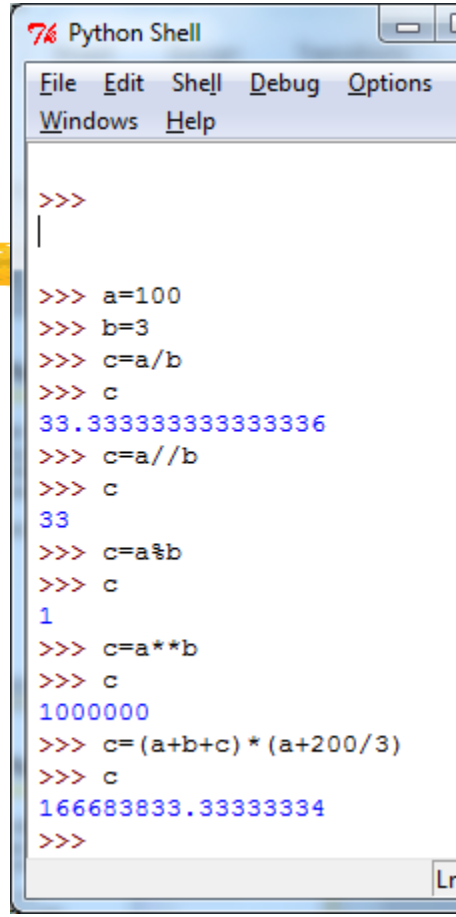
var1, var2 = value1, value2

Example:

a = 100

c = a+b

a, b =100, 3



print()

print() is to print any value or variable from the arguments

```
print(var)
print(var1, var2,…)
```

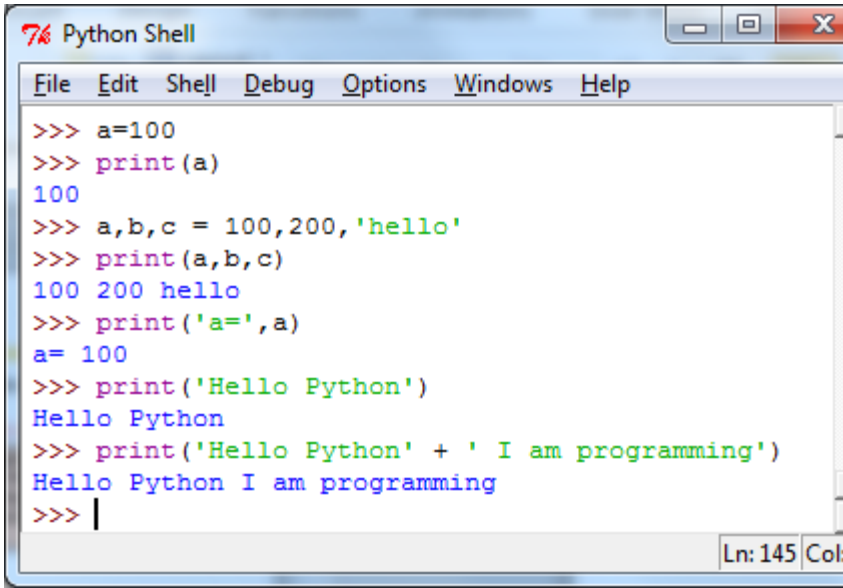
>>> print(a) # prints the variable a

>>> print(a,b,c) # prints the variables a,b,c

>>> print(‘hello python’) # print text

>>> print(‘a=‘, a)

print the text ‘a=‘ then the value of a



input()

input() is to read from keyboard until press ‘enter’

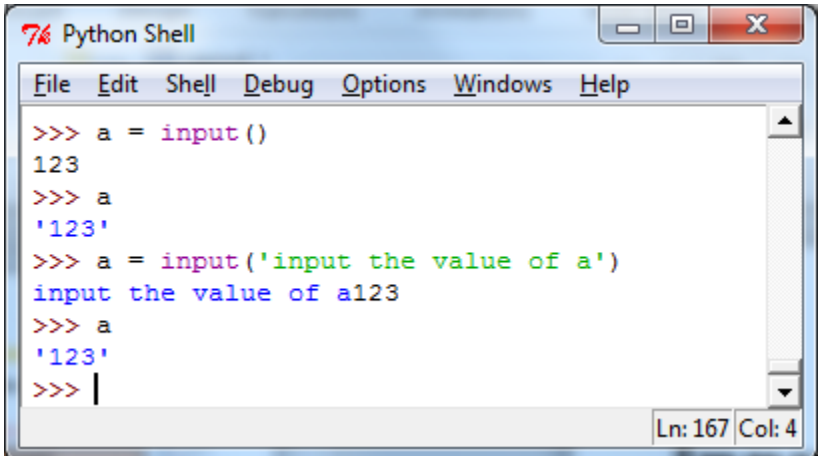
The function returns a string / text value with what it has typed

```
var = input()
var  = input(‘message to print before typing’)
```

>>> a=input() # read a value and assign it to a.

>>> a=input(‘input value for a’)

print the text and read the value



Value Conversion

input() always returns a str value.

Conversion is possible using `type(value)` which converts value to the specified type.

```
>>> a = '123'          # a is a str variable
>>> b = int(a)         # b is an int variable
>>> a = int(input('type the value of a; '))
```

```
var = type(input('var='))
```

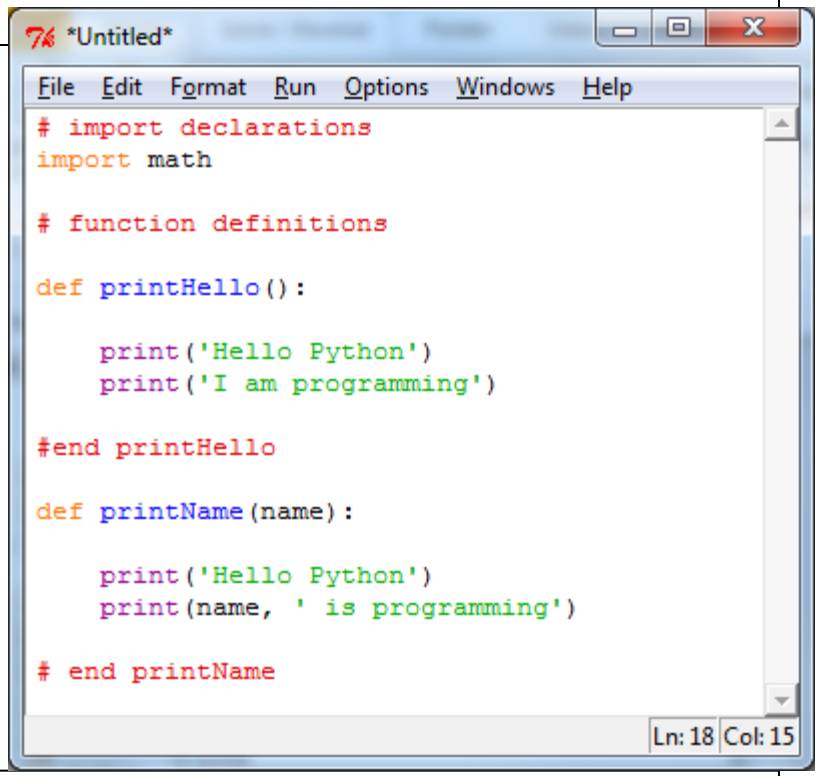
What is a Python program like?

A Python program is made of some functions that can be executed.

Sections of a Python program

1. import libraries declarations
2. function definitions

```
def functionName(a1,a2,…):
        line1
        line2
        ….
```



Any function can be called / executed on the interpreted.

Problem Solving

Write a Python program to solve the equation a*x**2 + b*x+c=0.

Input Variables: a, b, c float

Output Variables: x1, x2 as float

Calculation:

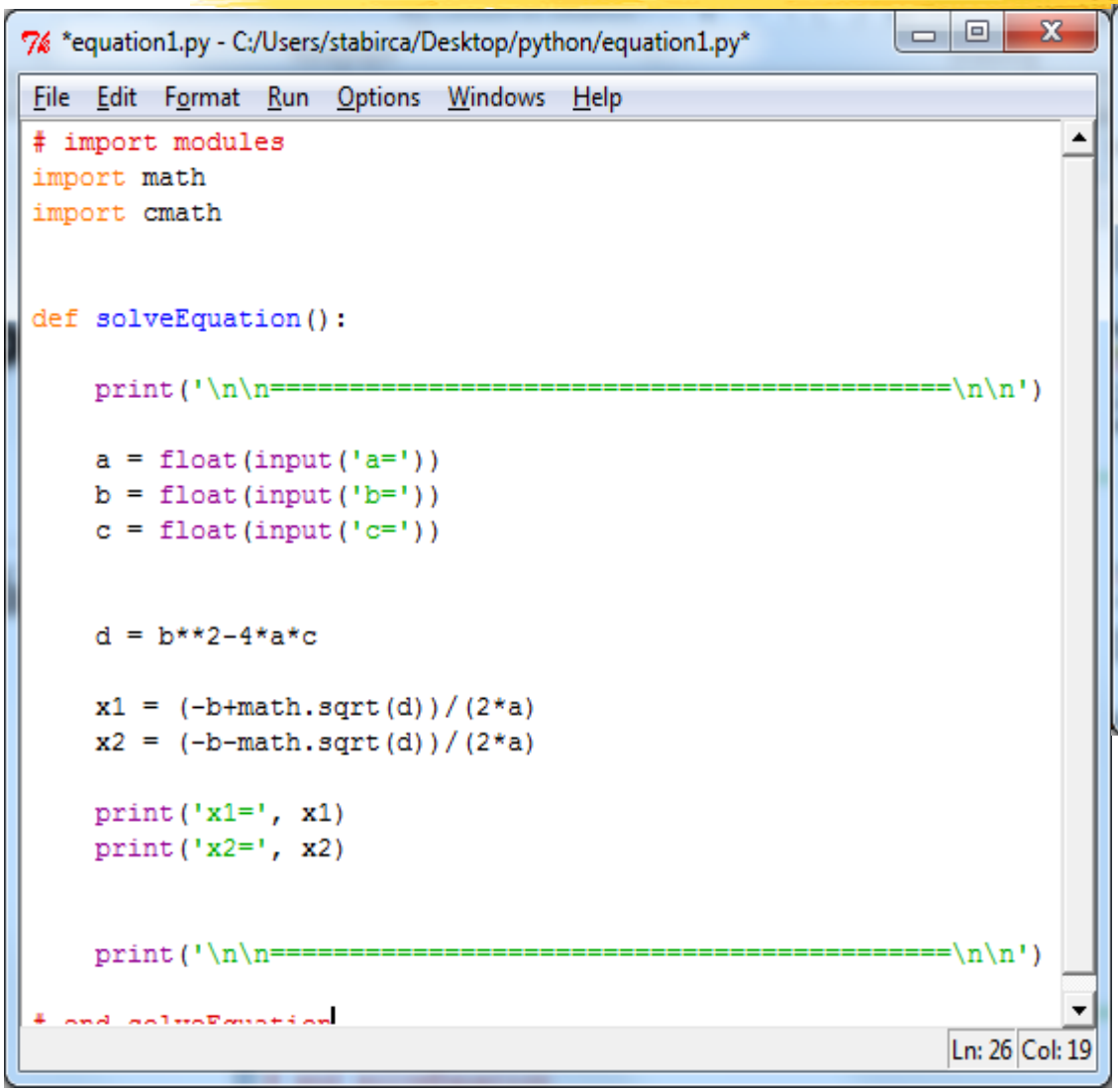
x1 = (-b + sqrt(b*b-4*a*c))/(2*a)

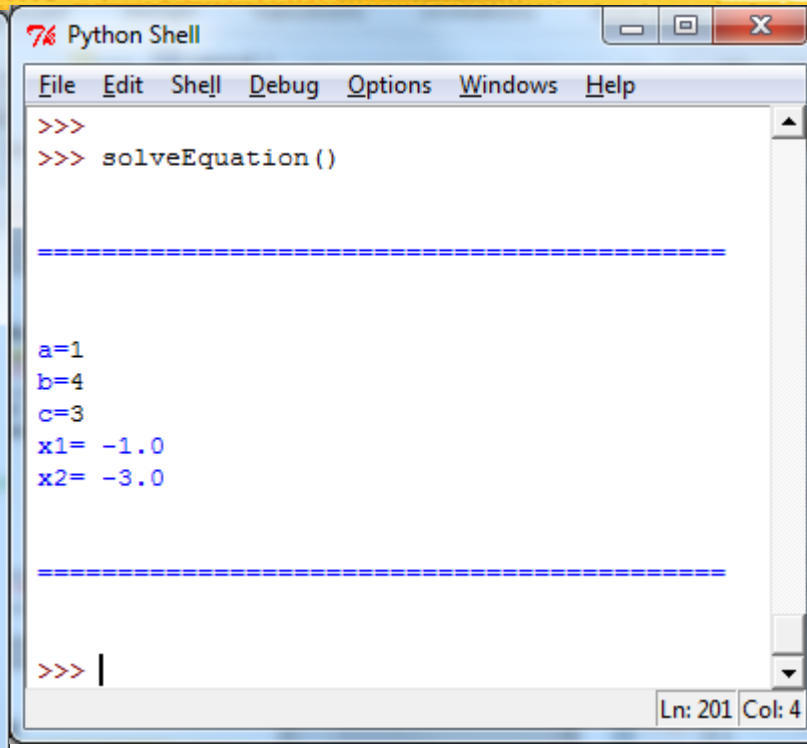
x2 = (-b - sqrt(b*b-4*a*c))/(2*a)

Python program with one function:

1) Input a,b,c
2) Calculate x1, x2
3) Print x1, x2

Problem Solving





To do List

1. Read Chapter 3 from the Python tutorial.

2. Solve the HW problems