

CBSE - XI Computer Science (083)

Computer Science with Python
by sumita arora



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Getting Started with Python

python

► Installation of Python Interpreter

► <https://www.python.org/>

0 A Python Software Foundation [US] | <https://www.python.org>

Python

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```
TT: s n s
>>> 'Fruits = ['Banana', 'Apple', 'Lime']
I
>>> loud_fruits = [fruit.upper() for fruit
in fruits]
>>> print(loud_fruits)
['BANANA', 'APPLE', 'LIME']

# List and the enumerate
function >>>
list(enumerate(fruits))
[(0, 'Banana'), (1, 'Apple'), (2, 'Lime')]
```

Compound Data Types

Lists (known as arrays in other languages) are one of the compound data types that Python understands. Lists can be indexed, sliced and manipulated with other built-in functions.

[More about lists in Python 3](#)



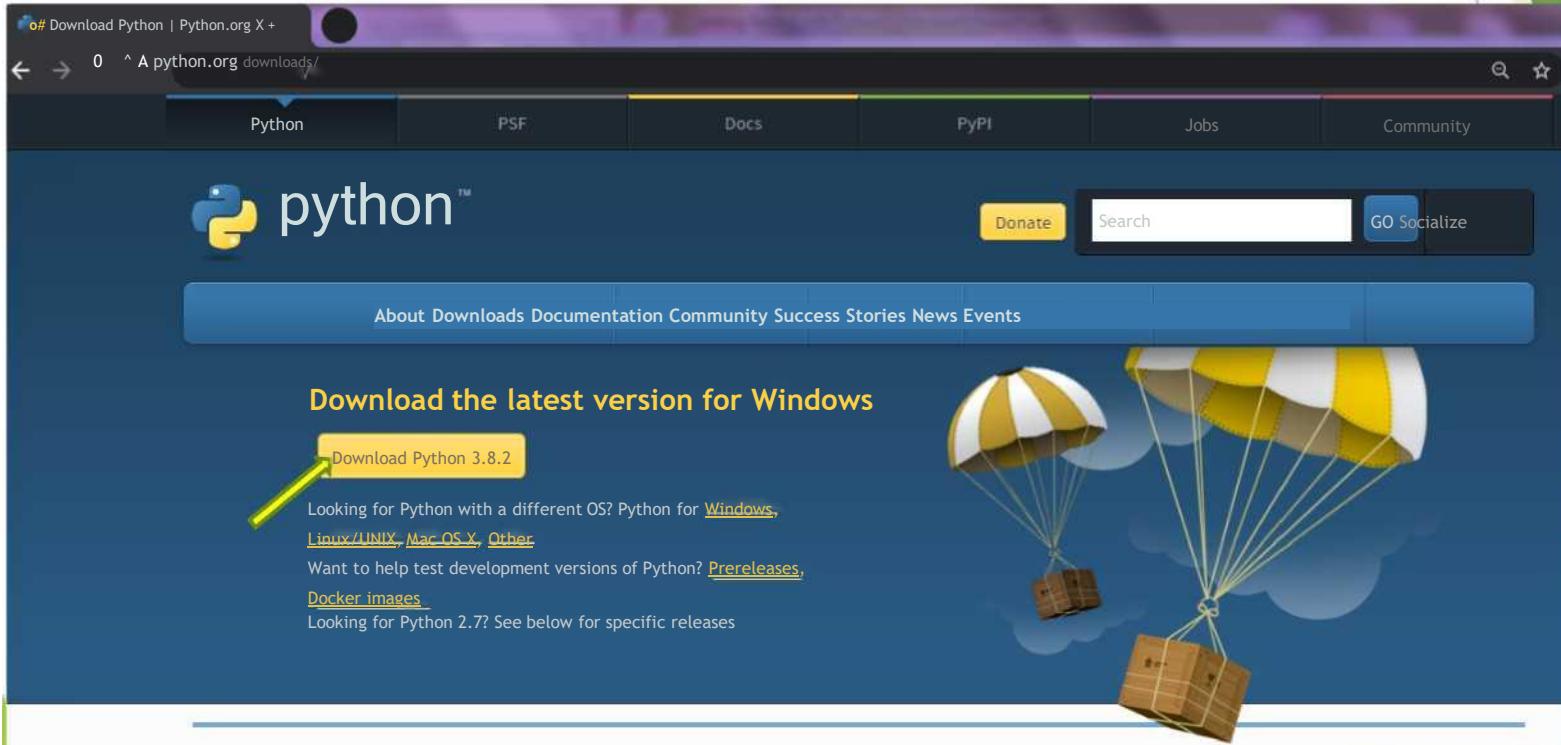
Python is a programming language that lets you work quickly
and integrate systems more effectively. >>> [Learn More](#)

Getting Started with Python



python

- ▶ **Python 3.8.2 Released on February 24, 2020**
- ▶ One can download Python Versions as per his/her Machine's Configuration & OS



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0 ^ A python.org downloads/

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Download Python 3.8.2

Looking for Python with a different OS? Python for [Windows](#), [Linux/UNIX](#), [Mac OS X](#), [Other](#)

Want to help test development versions of Python? [Prereleases](#), [Docker images](#)

Looking for Python 2.7? See below for specific releases

Getting Started with Python

- ▶ **IDLE (Integrated Development & Learning Environment)**
the most popular and standard Python development environment.
- ▶ Python can be used in two ways: **Interactive(shell) & Script mode**
 - ▶ **Interactive mode** allows to interact with operating system
 - ▶ **Script mode** allows to create and edit python source file

Python - Interactive Mode (Offline)

- ▶ Launch Python IDLE installed on your Computer System
- ▶ Note the welcome message
- ▶ Python Primary prompt ‘>>>’
- ▶ Try the following - credits(), copyright(), license(), help(), exit()

```
T*-"Python Shell" *
File Edit Shell Debug Options Windows Help
Python 3.0.1 (r301:69561, Feb 13 2009, 20:04:18) (MSC v.1500 32 bit (Intel))
Type "copyright", "credits" or "license()" for more information.
>> license ( )
A. HISTORY OF THE SOFTWARE

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.
In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.
In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.
```





Python - Interactive Mode

- ▶ Interactive mode allows users to interact with Operating System

```
>>> a = 3 >>> b = 4 >>> a * b
```

▶ 12

```
>>> 20 * a #For Multiplication *
```

▶ 60

```
>>> b ** 3 #For raise to the Power **
```

▶ 64

```
>>> width = 10 #Variables can be any string >>> height = 4 >>> width * height
```

▶ 40

Python - Interactive Mode (Offline)

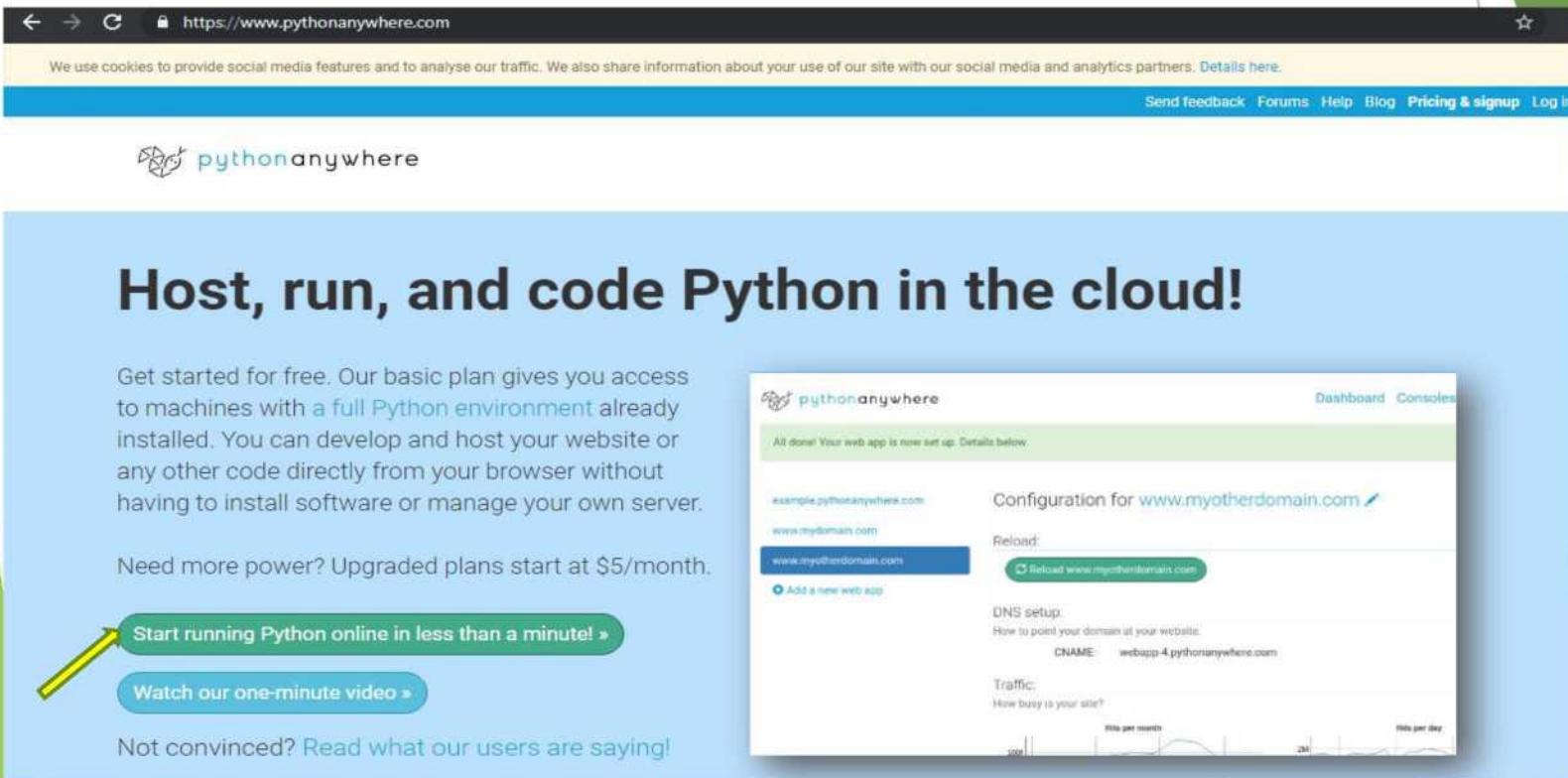


- ▶ Write your **Python Program** in **IDLE** installed

```
76 Python Shell
File Edit Shell Debug Options Windows Help
Python 3.0.1 (r301:69561, Feb 13 2009, 20:04:18) [MSC v.1500 32 bit (Intel)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> a=3
>>> b=4
>>> a*b
12
>>> 20*a
60
>>> b**3
64
>>> width = 10    #Variables can be any string
>>> height = 4
>>> width * height
40
>>> |
```

Python - Interactive Mode (Online)

► <https://www.pythonanywhere.com/>



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 pythonanywhere

Host, run, and code Python in the cloud!

Get started for free. Our basic plan gives you access to machines with a full Python environment already installed. You can develop and host your website or any other code directly from your browser without having to install software or manage your own server.

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All done! Your web app is now set up. Details below.

example.pythonanywhere.com Configuration for [www.myotherdomain.com](#) ↗

www.mydomain.com Reload: [Reload www.myotherdomain.com](#)

Add a new web app

DNS setup: How to point your domain at your website.

CNAME: webapp-4.pythonanywhere.com

Traffic: How busy is your site?

Visits per month Visits per day





Python - Interactive Mode (Online)

► Create a Beginner Account

V- O <https://www.pythonlywhere.com/pricing/>

Send feedback Forums Help Blog Pricing & signup Log in

pythonanywhere

Plans and pricing

Beginner: Free!

A limited account with one web app at your-username. pythonanywhere.com, restricted outbound internet access from your apps, low CPU/bandwidth, no Jupyter notebook support.

It works and it's a great way to get started

[Create a Beginner account](#)

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Are you a teacher looking for a place your students can code Python? You're not alone. Click through to find out more about our [Education beta](#).

All of our paid plans come with a no-quibble 30-day money-back guarantee

you're billed monthly and you can cancel at any time. The minimum contract length is just one month. You get unrestricted Internet access from your applications, unlimited in-browser Python, Bash and database consoles, and full SSH access to your account. All accounts (including free ones) have screen-sharing with other PythonAnywhere accounts, and free SSL support (though you'll need to get a certificate for your own domains)

Hacker	\$5/month	Web dev	\$12/month Standard	\$99/month Custom	\$5 to \$500/month
Run your Python code in the cloud from one web app and the console		If you want to host small Python-based websites for you or for your clients		Start a business and don't worry about having to scale to handle traffic spikes	Want a combination that's not on the list? Create your own! All custom plans have:

Python - Interactive Mode (Online)



► Create a Beginner Account

https://www.pythonanywhere.com/registration/register/beginner/

 pythonanywhere

Create your account

Username:

Email:

Password:

Password (again):

I agree to the [Terms and Conditions](#) and the [Privacy and Cookies Policy](#), and confirm that I am at least 13 years old.

Register

We promise not to spam or pass your details on to anyone else.

Python - Interactive Mode (Online)



Write your Python Code Online

0 A <https://www.pythontanywhere.com/1ser/abcuser/consoles/12976506/>

 Python3.7 console 12976506

```
Python 3.7.0 (default, Aug 22 2018, 20:50:05)
[GCC 5.4.0 20160609] on linux
Type "help", "copyright", "credits" or "license" for more information.
```

```
>> a=5
>> b=6 >>
a*b 30
```

Python - Libraries

- ▶ **NUMPY - Numerical Python**
 - ▶ Complex Matrices & Multi-dimensional array based problems
- ▶ **SCIPY - Scientific Python**
 - ▶ Optimization, Linear Algebra, Integration, Interpolation, Special functions, FFT, Signal and Image Processing
- ▶ **MATPLOTLIB - Visualization**
 - ▶ Graphical representation of data
- ▶ **PANDAS - Data Manipulation and Analysis**
 - ▶ Offers data structures and operations for manipulating numerical tables and time series

Python - Libraries



- ▶ We need to install all the libraries one by one using **PIP Installer** and then **Import the Library** to use its functions
- ▶ The Installation and Import procedure for each Library may be avoided

if we download and install - **ANACONDA**

- ▶ Anaconda is the entire suite containing **Basic Python**, **Numpy**, **Scipy**, **Matplotlib** and **Pandas**

Python - Anaconda

► <https://www.anaconda.com/>

ANACONDA

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2019 STATE OF DATA SCIENCE REPORT

This spring, we surveyed nearly 5,000 members of the Anaconda community to understand current trends in data science. Read all about it in the full report available now.

Download the Report

Latest news: Anaconda named a May 2019 Gartner Peer Insights Customers' Choice for Data Science and Machine Learning Platforms.

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ACCEPT

Python - Anaconda

► <https://www.anaconda.com/>

The screenshot shows the Anaconda Distribution homepage with a green header and a white main content area. The header includes the Anaconda logo, navigation links for Products, Why Anaconda?, Solutions, Resources, Company, and a prominent 'Download' button. The main content features a large 'Anaconda Distribution' title, a sub-headline 'The World's Most Popular Python/R Data Science Platform', and a 'Download' button. Below this, a paragraph describes the Anaconda Distribution as the easiest way to perform Python/R data science and machine learning on various operating systems, with over 15 million users. A yellow arrow points from the text 'analyze data with scalability and performance with Dask, NumPy, pandas, and Numba' to the 'pandas' logo in a grid of data science libraries.

The open-source Anaconda Distribution is the easiest way to perform Python/R data science and machine learning on Linux, Windows, and Mac OS X. With over 15 million users worldwide, it is the industry standard for developing, testing, and training on a single machine, enabling *individual data scientists* to:

- Quickly download 1,500+ Python/R data science packages
- Manage libraries, dependencies, and environments with Conda
- Develop and train machine learning and deep learning models with scikit-learn, TensorFlow, and Theano
- Analyze data with scalability and performance with Dask, NumPy, pandas, and Numba

A grid of 15 logos representing various data science and machine learning libraries. The logos are arranged in three rows of five. A yellow arrow points from the text 'analyze data with scalability and performance with Dask, NumPy, pandas, and Numba' to the 'pandas' logo in the second row.

- jupyter
- spyder
- NumPy
- SciPy
- Numba
- pandas
- DASK
- Bokeh
- HoloViews
- DataShader
- matplotlib
- scikit-learn
- H2O.ai
- TensorFlow
- CONDA

Python - Anaconda

- ▶ Launch Anaconda Navigator
- ▶ Many IDEs visible

Anaconda Navigator

File Help

Sign in to Anaconda Cloud

Refresh

Home Environments Learning Community Documentation Developer Blog

ANACONDA NAVIGATOR

Applications on base (root) Channels

JupyterLab 0.32.1

An extensible environment for interactive and reproducible computing, based on the Jupyter Notebook and Architecture.

Launch

jupyter Notebook 5.5.0

Web-based, interactive computing notebook environment. Edit and run human-readable docs while describing the data analysis.

Launch

IP(y) Qt Console 4.3.1

PyQt GUI that supports inline figures, proper multiline editing with syntax highlighting, graphical calltips, and more.

Launch

Spyder 3.2.8

Scientific Python Development Environment. Powerful Python IDE with advanced editing, interactive testing, debugging and introspection features

Launch

Glueviz 0.13.3

Multidimensional data visualization across files. Explore relationships within and among related datasets.

Launch

Orange 3 3.17.0

Component based data mining framework. Data visualization and data analysis for novice and expert. Interactive workflows

Launch

RStudio 1.1.456

A set of integrated tools designed to help you be more productive with R. Includes R essentials and notebooks.

Launch

VS Code 1.36.1

Streamlined code editor with support for development operations like debugging, task running and version control.

Launch

Python - Anaconda



- ▶ Launch Zupyter Notebook 5.5.0
- ▶ It will Open in default Browser & shows root directory/path(localhost:8889/tree)

A screenshot of the Jupyter Notebook interface. The title bar shows the URL localhost:8889/tree. The logo on the left is a stylized orange and red 'jupyter'. The top menu bar includes 'Files', 'Running', 'Clusters', 'Upload', 'New', and 'Logout'. A yellow arrow points to the 'Files' tab. The main content area displays a file tree and a list of files. The file tree on the left shows a root folder with subfolders: 'amit', 'Contacts', 'day4', 'Desktop', 'Documents', 'Downloads', 'Favorites', 'files', and 'Links'. The list on the right shows the following files with their last modified times:

Name	Last Modified
8 months ago	
2 years ago	
8 months ago	
5 minutes ago	
9 days ago	
33 minutes ago	
2 years ago	
8 months ago	
5 months ago	

Python - Anaconda

► Click **New -> Python 3** to open a new Zupyter Notebook

A screenshot of the Jupyter Notebook interface. The top bar includes the Jupyter logo, a search bar, and buttons for "Quit" and "Logout". The main area shows a list of files and clusters. A context menu is open over a file named "Name 4.ipynb", with "Python 3" highlighted by a yellow arrow. The menu also includes options for "Text File", "Folder", and "Terminal".

Files Running Clusters

Duplicate Move View Edit

CD amit

CD Contacts

CD day4

CD Desktop

CD Documents

CD Downloads

CD Favorites

CD files

11 days ago

5 hours ago

2 years ago

8 months ago

Name 4.ipynb

Python 3

Text File

Folder

Terminal

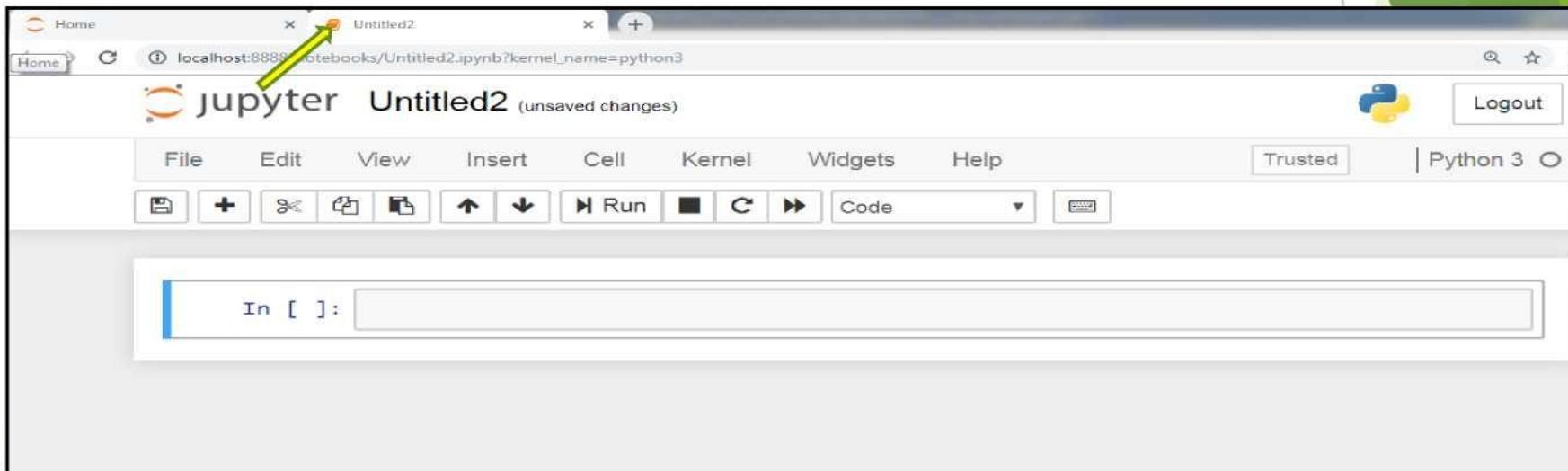
Upload New

Create a new notebook with Python 3

Python - Anaconda



- The new Zupyter Notebook will open in the new Browser Window



Python - Anaconda



- ▶ Type the code in the Input Block of the **Zupyter Notebook** (Interactive Mode) and get the Output in separate block by pressing **Run Button** or **SHIFT+ENTER** Key

A screenshot of a Jupyter Notebook interface. The title bar says "jupyter Untitled2 (unsaved changes)". The toolbar includes File, Edit, View, Insert, Cell, Kernel, Widgets, Help, Trusted, and Python 3. The toolbar buttons include a file icon, a plus sign, a delete icon, a copy icon, a cell icon, an up arrow, a down arrow, a "Run" button (which has a yellow arrow pointing to it), a cell type icon, a code dropdown, and a refresh icon. Below the toolbar, the "In [1]" cell contains the following Python code:

```
a=10
b=20
print(a+b)
```

The output "30" is shown below the code. A second, empty "In []:" cell is visible at the bottom.

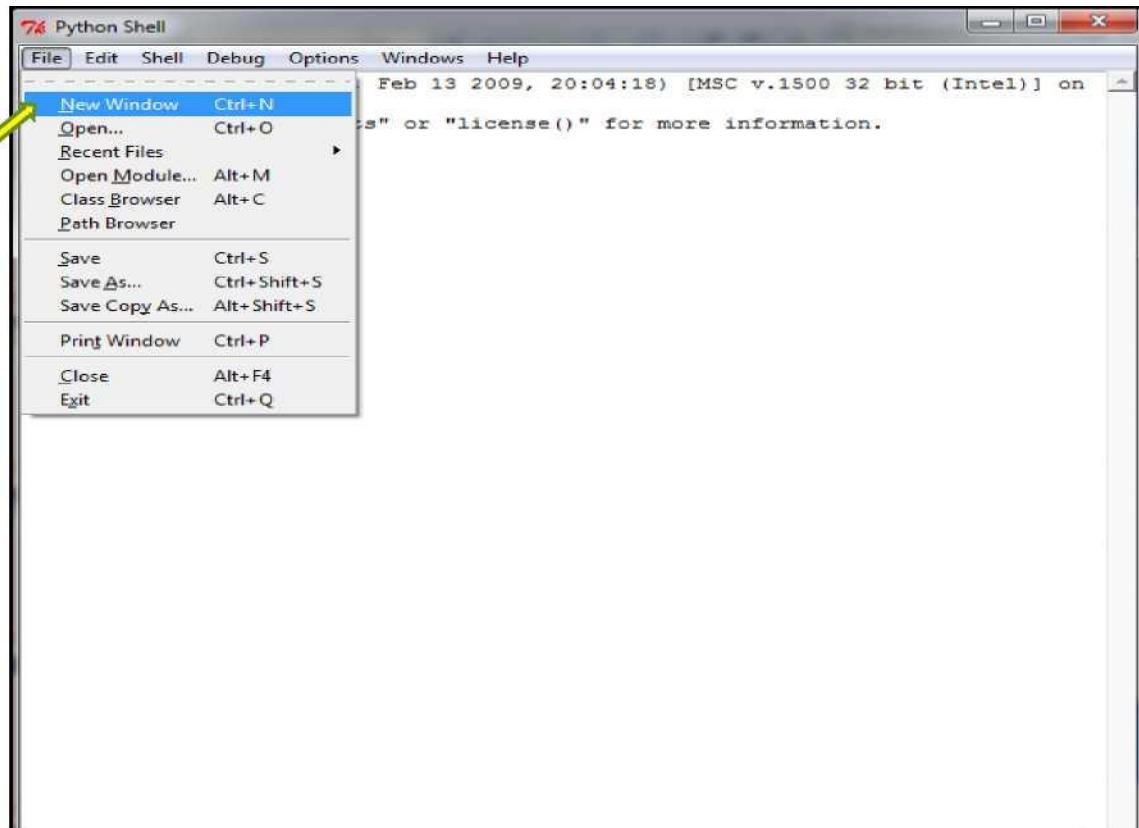


Python - Script Mode

- ▶ **Script Mode** allows the user to type Python program in a file and use interpreter to execute content of file.
- ▶ Start comments with **#**
- ▶ the rest of line is ignored.

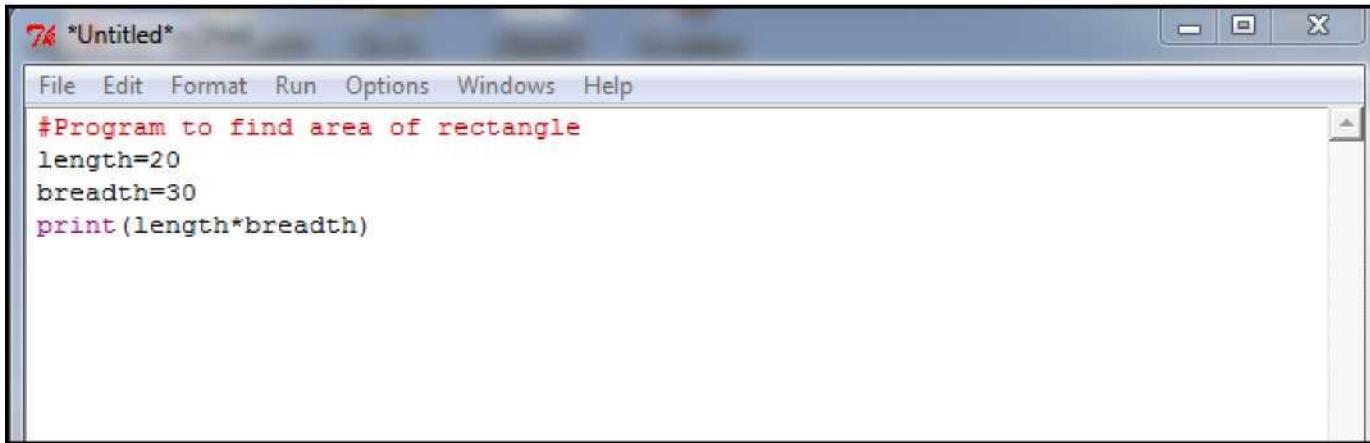
Python - Script Mode

► Open New Window from File Menu



Python - Script Mode

- ▶ Type your Python Code in the **New Window**



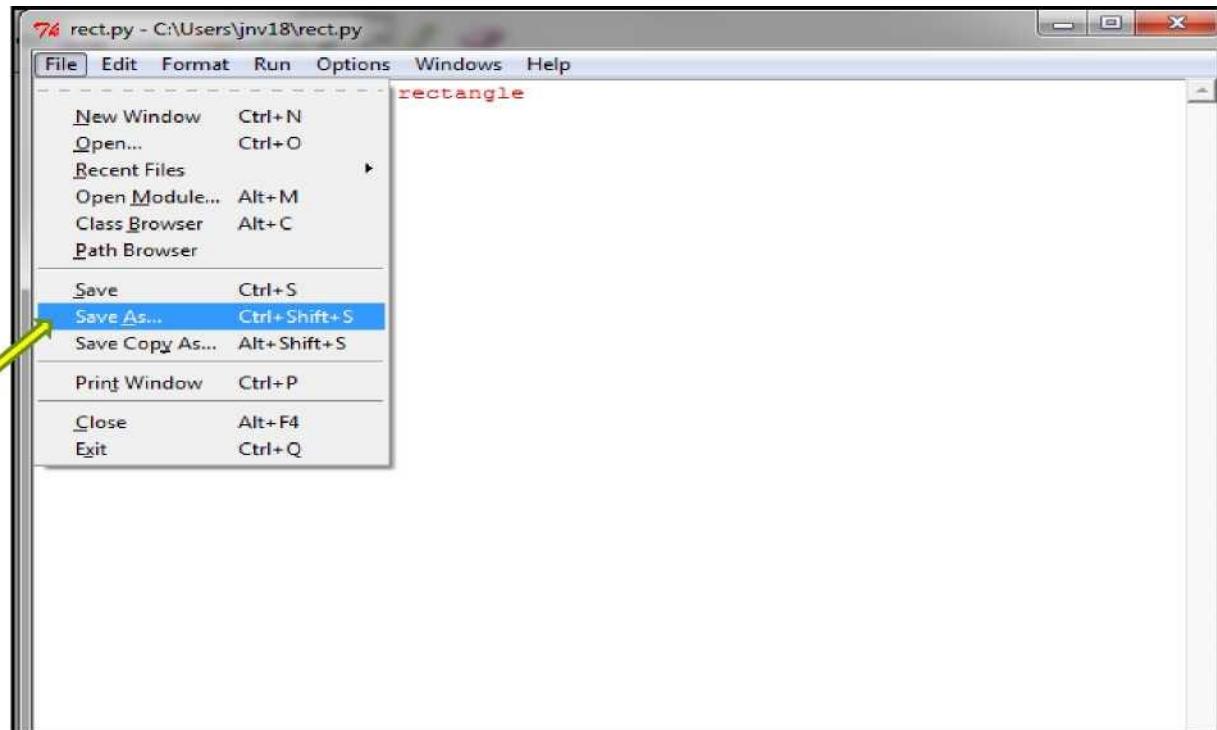
The image shows a screenshot of a Windows-style text editor window. The title bar reads "74 *Untitled*". The menu bar includes "File", "Edit", "Format", "Run", "Options", "Windows", and "Help". The main text area contains the following Python code:

```
#Program to find area of rectangle
length=20
breadth=30
print(length*breadth)
```

Python - Script Mode



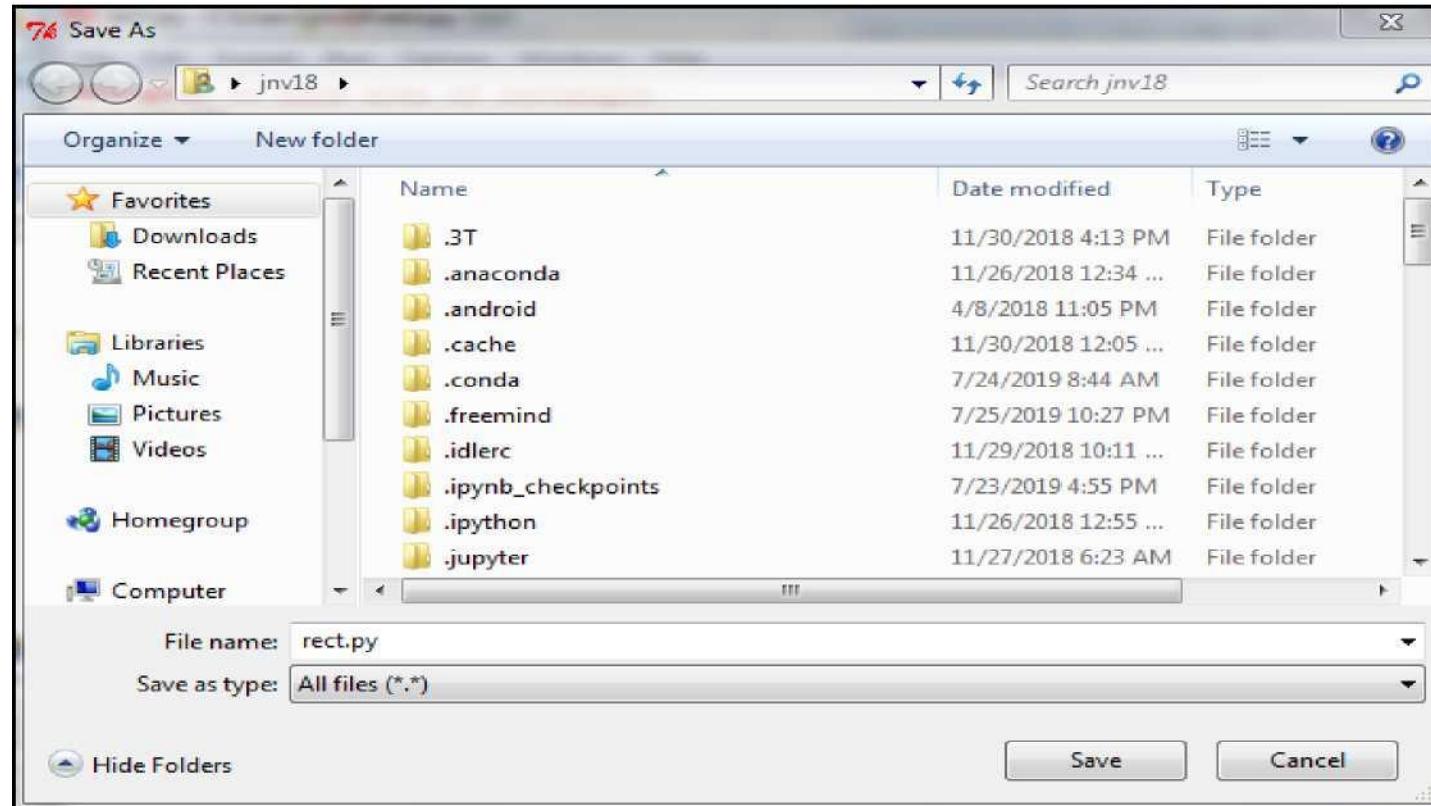
- Save the Python code file: **File -> Save As...**



Python - Script Mode



► Save the Python code file with an extension **.py**

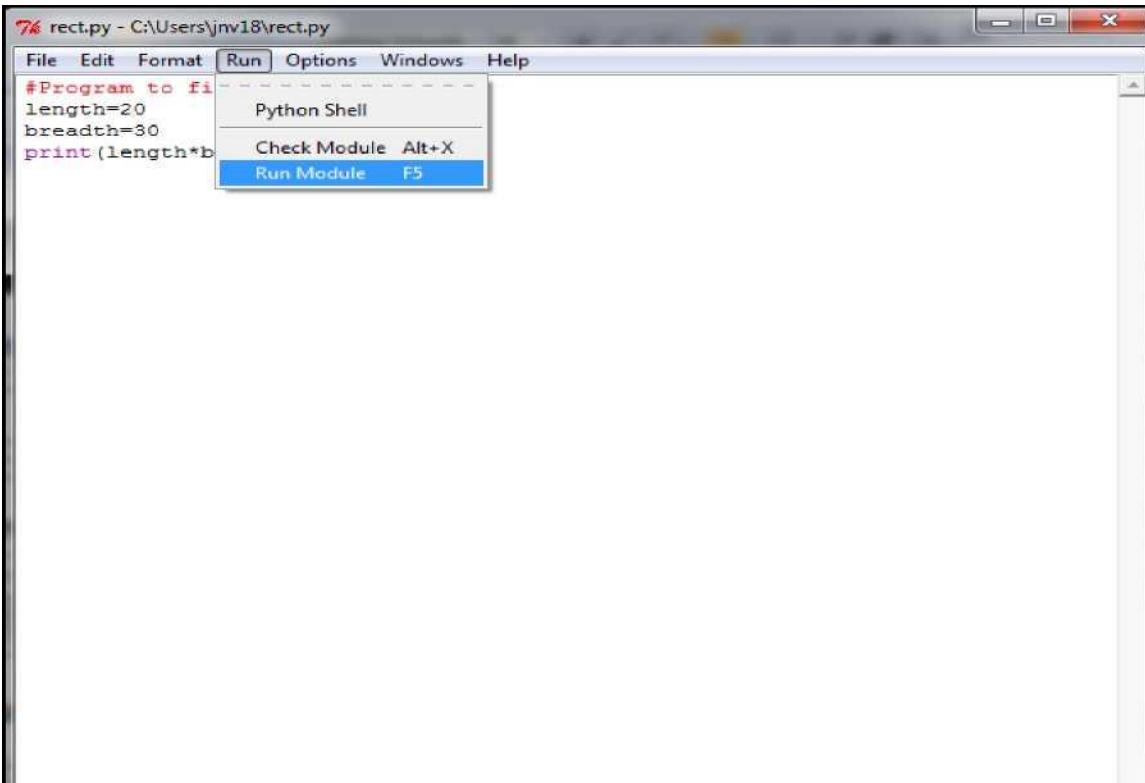




python™

Python - Script Mode

- o Run the Python code by pressing **F5** or **Run -> Run Module**



Python - Script Mode

- The **Output** of the Python Code will be displayed in the **Interactive Code Window**



```
76 Python Shell
File Edit Shell Debug Options Windows Help
Python 3.0.1 (r301:69561, Feb 13 2009, 20:04:18) [MSC v.1500 32 bit (Intel)] on
win32
Type "copyright", "credits" or "license()" for more information.
>>> ===== RESTART =====
>>>
600
>>>
```

Python - Script Mode (Alternate)

- ▶ Go to Command Prompt in Windows (`cmd.exe`) and just type your python file name e.g. `rect.py` and press enter to run it



A screenshot of a Windows Command Prompt window. The title bar reads "cmd C:\Windows\system32\cmd.exe". The window content shows the following text:

```
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\jnv18>rect.py
600

C:\Users\jnv18>
```