Programming with Python

Python

- High-level versatile programming language
- Widely used in
    - Web development
    - Data analytics
    - AI
    - Game development
    - Resource planning
    - Automation and More
- Simple syntax/ readability (English like)/ Beginner Friendly/ Easy to learn and write code in.
- In -demand: Widely used across various domains and industries. Supported extensively by Tech firms such Google, Amazon, OpenAI, Netflix etc.

Setting up Python:

- Download python from https://www.python.org . Installing the downloader will install Python along with IDLE, and IDE. IDE (Integrated Development environment)
- Other IDE/Editors: IDLE, Spyder, VSCode etc.
- Cloud/web based: Google colab, Jupyter Notebook

Python: Shell/Script Mode:

- Shell Mode:
    - Interactive mode to execute python commands line by line
    - Instant execution, good/useful for testing code.
    - Python shell can be used as a calculator.

- Script Mode:
    - Allows writing complete programs in a file. Usually with a '.py' extension.
    - Could write reusable python programs.

Console Output: 'print'

```
>>> print('hello world')
hello world
>>> 18+20
38
>>> 4**3
64
```

```
>>> 6/3/3            #division is left associative
0.6666666666666666
>>>
>>> 2**3**2          #**(exponentiation) is Right associative
512
>>> 20-4(5*1)        #Is this ok?
```

Arithmetic Operators (in decreasing order of precedence):
( ) - parenthesis
** exponentiation
/ (div), //(integer div), *(mult), % (mod, remainder)

Python Strings:
Sequence of Characters enclosed in single, double or triple quotes. Triple quotes for multi-line string.

```
>>>'Hello World'
'Hello World'
>>>print('Hello World')
Hello World
>>>'''Hello

>>> '''Spread
... over
... multiple
... lines'''
'Spread\nover \nmultiple \nlines'
>>>
>>> print('''Spread
... over
... multiple
... lines''')
Spread
over
multiple
lines
```

String Concatenation(+) and Repetition(*)
```
>>> 'South ' + 'Asian ' + 'University'
'South Asian University'

>>> 'multiple' * 3
'multiplemultiplemultiple'
>>>
```

Variables, Assignment, Datatypes
Variables: Containers for Storing data values. Variables have datatype
```
>>> name='Sargam'
>>> type(name)
<class 'str'>

>>> age=22
>>> type(age)
<class 'int'>

>>> height=5.6
>>> type(height)
<class 'float'>

>>> is_student=True
>>> type(is_student)
<class 'bool'>
```

- Variable names must begin with a letter or underscore(_)
- Variable names may contain letters, digits or underscore(_)

Assignment (=), Binds variables to objects (value to a name)

Multiple assignment:
```
>>>name, age, day = 'Ajay', 23, 'Monday'
```

Swap two numbers using assignment(pythonic)
```
>>> n1 = 10
>>> n2 = 20
>>> n1, n2 = n2, n1
>>> print(n1, n2)
20 10
>>>
```

Input from Console (input results in a string/text object)

>>> course_name = input('Enter your Course Name: ')
Enter your Course Name: Python Programming
>>> print(course_name)
Python Programming

Quick Reference
1. **Printing Output**
   - Use the `print()` function to display output.
     Example:
     print("Hello, World!")

2. **Variables and Data Types**
   - Variables store data values.
     Example:
     name = "Alice" # String
     age = 25   # Integer
     height = 5.6   # Float
     is_student = True # Boolean

3. **Basic Arithmetic Operations**
   - Addition: + | Subtraction: - | Multiplication: * | Division: /
     Example:
     print(10 + 5) # 15
     print(10 / 2) # 5.0

Practice Problems

Age to 100 Calculator
Write a program that:
- Asks the user for their name and age.
- Calculates the year when they will turn 100 years old.

Example Output:
Hi Alice, you will turn 100 years old in the year 2098.

Area of a Rectangle
Write a program that:
- Takes the length and width of a rectangle as input.
- Calculates and prints the area.

Formula: Area = length * width

Simple Calculator

Write a program that:
- Takes two numbers as input.
- Prints their sum, difference, product, and quotient.

Tip Calculator

Create a program that calculates the total bill with a tip.
- Ask for the bill amount and desired tip percentage.
- Calculate and print the total amount to be paid.

Example Output:
Bill: Rs 100 | Tip: 15% | Total: Rs 115