LAB # 02

VARIABLES AND OPERATORS

OBJECTIVE

Implement different type of data types, variables and operators used in Python.

THEORY

Variable

Variables are nothing but reserved memory locations to store values. This means that when you create a variable you reserve some space in memory.

Rules for constructing variable names

A variable can have a short name (like x and y) or a more descriptive name (age, carname, total_volume). Rules for Python variables:

- A variable name must start with a letter or the underscore character
- A variable name cannot start with a number
- A variable name can only contain alpha-numeric characters and underscores (A-z, 0-9, and _)
- Variable names are case-sensitive (age, Age and AGE are three different variables)

Example

```
x= 5 y=
"John"
print(x)
print (y)
```

Output:

```
>>> %Run task1.py
5
John
```

Variables do not need to be declared with any particular type and can even change type after they have been set.

Example:

```
x= 4 x=
"Sally"
print(x)
```

Output:

```
>>> %Run task2.py
Sally
```

Assign Value to Multiple Variables

Python allows you to assign values to multiple variables in one line

Example:

```
x, y, z = "Orange", "Banana", "Cherry"
print(x) print(y) print(z)
```

Output:

```
>>> %Run task3.py
Orange
Banana
Cherry
```

To combine both text and a variable, Python uses the + character

Example:

```
x= "awesome"
print("Python is " , x)
```

Output:

```
>>> %Run task4.py Python
is awesome
```

Python Keywords

Keywords are the words whose meaning have already been explained to the Python compiler. The keywords cannot be used as variable names,function name or any identifier because if we do so we are trying to assign a new meaning to the keyword, which is not allowed by the computer. Keywords are also called 'Reserved words'. Some keywords are as follows:

false	class	finally	is	return	none	continue	for	try	break
true	def	for	from	while	and	del	not	with	as
elif	if	or	except	in	raise	yield			

Data Types

Data types specify how we enter data into our programs and what type of data we enter. Python Data Types are used to define the type of a variable.

Python has five standard data types −

- Numbers (int, float)
- String
- List
- Tuple
- Dictionary

You can get the data type of any object by using the "type( )" function.

Operators

Operators are special symbols in Python that carry out arithmetic or logical computation.

Python divides the operators in the following groups:

- Arithmetic operators
- Assignment operators
- Comparison operators
- Logical operators
- Identity operators
- Membership operators
- Bitwise operators

Python Arithmetic Operators

Arithmetic operators are used with numeric values to perform common mathematical operations:

Operator	**Name**	**Example**
+	Addition	x + y
-	Subtraction	x - y
*	Multiplication	x * y
/	Division	x / y
%	Modulus	x % y
**	Exponentiation	x ** y
//	Floor division	x // y

Python Relational Operators

Comparison operators are used to compare two values:

Operator	Name	Example
= =	Equal	x = = y

!=	Not equal	x != y
>	Greater than	x > y
<	Less than	x < y
>=	Greater than or equal to	x >= y
<=	Less than or equal to	x <= y

Python Logical Operators

Logical operators are used to combine conditional statements:

Operator	Name	Example
and	Return True if both statements are true	x < 5 and x < 10
or	Return True if one of the statements is true	x < 5 or x < 4
not	Reverse the result, returns False if the result is true	not (x<5 and x< 10)

EXERCISE

A. Point out the errors, if any, in the following Python statements.

1.
```
x=5:
  print(x)
```

In this program (:) is causing the error in the first line.

2.
```
1TEXT = "SSUET"
NUMBER = 1
print(NUMBER+ TEXT)
```

In this program (1) is causing the error in the first line and in the third line (+) is causing the error.

3.
```
a = b = 3 = 4
```

In this program (=) is causing error b/w a and b , 3 and 4

B. Evaluate the operation in each of the following statements, and show the resultant value after each statement is executed.

1.
```
a = 2 % 2 + 2 * 2 - 2 / 2;
```

```
>>> %Run 'Lab 2 1.py'
  3.0
>>>
```

2. `b = 3 / 2 + 5 * 4 / 3 ;`

```
>>> %Run 'Lab 2 1.py'
  8.166666666666668
>>>
```

3. `c = b = a = 3 + 4 ;`

```
>>> %Run 'Lab 2 1.py'
  7
>>>
```

C. Write the following Python programs:

1. Write a program that calculates area of a circle $A=\pi r^2$. (Consider $r = 50$).

Code:

```
"""
Abdul Moiz Chishti
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"""

pi = 3.14 #value of pi
r = 50 #value of radius of a circle
area = pi*r**2
print("area=",area,"sq cm")
```

Output:

```
>>> %Run 'Lab 2 1.py'
  area= 7850.0 sq cm
>>>
```

2. Write a program that performs the following four operations and prints their result on the screen.
   a. 50 + 4
b. 50 – 4
c. 50 * 4
d. 50 / 4

Code:

```
"""
Abdul Moiz Chishti
SE-20F-022
"""

a=50+4
b=50-4
c=50*4
d=50/4
print("Four Operations\n")
print("Solution of 50+4 =",a)
print("Solution of 50-4 =",b)
print("Solution of 50*4 =",c)
print("solution of 50/4 =",d)
```

Output:

```
>>> %Run 'Lab 2 1.py'

  Four Operations

  Solution of 50+4 = 54
  Solution of 50-4 = 46
  Solution of 50*4 = 200
  solution of 50/4 = 12.5

>>>
```

3. Write a Python program to convert height (in feet and inches) to centimeters. Convert height of 5 feet 7 inches to centimeters.

- First, convert 5 feet to inches: 5 feet × 12 inches/foot = 60 inches
- Add up our inches: 60 + 7 = 67 inches
- Convert inches to cm: 67 inches × 2.54 cm/inch = 170.18 cm

Code:

```
"""

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SE-20F-022

"""

print("feet = 5")

f=5

print("inches = 7")

i=7

x=(f*12)+i

print("height in Centimeters = (((f*12)+i)*2.54) =", (x*2.54))
```

Output:

```
>>> %Run 'Task 1.py'

  feet = 5
  inches = 7
  height in Centimeters = (((f*12)+i)*2.54) = 170.18

>>>
```

4. Write a program to compute distance between two points by creating variables (Pythagorean Theorem)

$$\text{Distance} = ((x2-x1)^2+(y2-y1)^2)^{1/2}$$

Code:

```
"""
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SE-20F-022
"""
x1=12
x2=24
y1=36
y2=48
print("distance=",((x2-x1)**2+(y2-y1)**2)**(1/2))
```

Output:

```
Python 3.7.7 (bundled)
>>> %Run 'Task 1.py'

  distance= 16.97056274847714

>>>
```