

PYTHON (TW)

UNIT- 01	Write a Program to demonstrate basic data type in python.
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Data type defines the kind of a value i.e the type of value whether it is int, string, float etc.

Since everything is an object in Python programming, data types are actually sclasses and variables are instance (object) of these classes.

We don't need to define data types in python because python is dynamically typed language, it automatically detects data types.

Python enables us to check the type of the variable used in the program. Python provides us the `type()` function, which returns the type of the variable passed.

Numbers: Represent numeral values like int, float, complex

1. **Int :** It contains positive or negative whole numbers. eg: 1,2,3,-1.....
2. **Float :** Contains real floating point representation . eg: 2.0,1.0,8.02....
3. **Complex :** Numbers of form $Ai+Bj$. eg: $2i+3j$

Program	Output
<pre>x = 20 #int print(x) print(type(x)) x = 20.5 #float print(x) print(type(x)) x = 1j #complex print(x) print(type(x))</pre>	<pre>20 20.5 1j</pre>

UNIT- 02**Write a Program to compute distance between two points taking input from the user (Pythagorean Theorem)**

Distance can be calculated using the two points (x_1, y_1) and (x_2, y_2) , the distance d between these points is given by the formula:

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

for e.g : let $x_1, y_1=10,9$ and $x_2, y_2=4,1$ then $(x_2-x_1)^2=(10-4)^2=6^2=36$ and $(y_2-y_1)^2=(9-1)^2=8^2=64$ now $64+36=100$ and 100 is square root of 100 sp distance between $(10,9)$ and $(4,1)$ is 10 .

Program	Output
<pre>import math a=input("enter first coordinate : ") p1 = a.split(",") b=input("enter second coordinate : ") p2 = b.split(",") distance = math.sqrt(((int(p1[0])- int(p2[0]))**2)+((int(p1[1])- int(p2[1]))**2)) print("distance between ", a,"and", b, "is",distance)</pre>	<pre>enter first coordinate: 4,0 enter second coordinate : 6,6 distance between 4,0 and 6,6 is 6.324555320336759</pre>

UNIT- 03**Write a Python Program using for loop, write a program that prints out the decimal equivalent of $1+1/2+1/3... 1/n$** **# Problem Solution**

1. Take in the number of terms to find the sum of the series for.
2. Initialize the sum variable to 0.
3. Use a for loop ranging from 1 to the number and find the sum of the series.
4. Print the sum of the series after rounding it off to two decimal places.
5. Exit.

Program	Output
<pre>def sum(n): i = 1 s = 0.0 for i in range (1, n+1): s = s + 1/i; return s;</pre>	2.283333

UNIT- 04

**Write a Python Program to find first n prime numbers.
Write a program to demonstrate list and tuple in python.**

Program to find first n prime numbers.

Problem Solution

1. Take in the upper limit for the range and store it in a variable.
2. Let the first for loop range from 2 to the upper limit.
3. Initialize the count variable to 0.
4. Let the second for loop range from 2 to half of the number (excluding 1 and the number itself).
5. Then find the number of divisors using the if statement and increment the count variable each time.
6. If the number of divisors is lesser than or equal to 0, the number is prime.
7. Print the final result.
8. Exit.

Program	Output
<pre>r= int (input ("Enter upper limit:")) print ("Prime number:" ,end ="") for a in range (2 r+1): k=0 for I in range (2, a //2+1): if(a%i==0): k=k+1 if (k<=0): print (a) else⊗a print (a, end=' ')</pre>	<pre>Enter upper limit :15 Prime numbers: 2 3 5 7 11 13</pre>

Program to demonstrate list and tuple in python.

demonstrate list.

List : It is as same as arrays , it contains heterogeneous datatypes .

Eg. : a=[1,2,"a"]

Program	Output
<pre># Creating an Empty List List = [] Print ("Empty List: ") print(List)</pre>	<p style="text-align: center;">Empty List:</p> <p style="text-align: center;">[]</p>
<pre># Creating a List with the use of multiple values List = ["1", "2","3","4"] print (List [0]) #accessing values of list print (List [1]) print (List [2]) print (List [3])</pre>	<p style="text-align: center;">1</p> <p style="text-align: center;">2</p> <p style="text-align: center;">3</p> <p style="text-align: center;">4</p>

demonstrate tuple.

Tuple is a sequence of python objects like list with immutable feature. We cannot add or remove an item in tuple. Tuples are created by (). It contains heterogeneous data-types.

Eg. : t =(1,2,'hello',20.5)

Program	Output
<pre># An empty tuple t = () print (t) tup = 'python', 'tuple' print(tup)</pre>	<p style="text-align: center;">()</p> <p style="text-align: center;">('python', 'tuple')</p>

UNIT- 05

**Write a program using a for loop that loops over a sequence.
Write a program using a while loop that asks the user for a number and prints a countdown from that number to zero.**

For loops iterate over a given sequence. In sequence either (dictionary, tuple, set, list and string)

for loop syntax (for **variable** in **sequence** or **range**)

Program using a for loop that loops over a sequence.

Program	Output
<pre>#For loop in list color_list=['red','green','white','purple','pink','marron'] for i in color_list: print(i)</pre>	red green white purple pink marron
<pre>#For loop in string fr_string="Goeduhub technologies" for i in fr_string: print(i)</pre>	G o e d u h u b t e c h n o l o g i e s
<pre>#For loop in dictionary fr_dict={1:'q',2:'w',3:'e',4:'r'} for i in fr_dict: print(i)</pre>	1 2 3 4
<pre>#Sum of all the list elements Num=[1,2,3,4,5,6,7,8,9,10] Sum=0 for i in Num: Sum=Sum+i print(Sum)</pre>	55

Program using a while loop countdown from any number to zero.

Step 1. Open PyCharm Editor. ...

Step 2. You will need to select a location.

Step 3. Now Go up to the "File" menu and select "New". ...

Step 5. Now type the following code...

Step 6. Now Go up to the "Run" menu and select "Run" to run your program.

Program	Output
<pre>num=int(input("Enter your number...")) while(num>=0): print(num) num=num-1</pre>	<p>Enter your number ...10</p> <p>10</p> <p>9</p> <p>8</p> <p>7</p> <p>6</p> <p>5</p> <p>4</p> <p>3</p> <p>2</p> <p>1</p> <p>0</p>

UNIT- 06

**Write a Python Program to add matrices.
Write a Python program to multiply matrices.**

Matrices addition in python..**Program Steps..**

The program that we are going to discuss next will follow the below-mentioned sequence:

- Ask the user to enter the number of rows and columns for the matrices to be added.
- Now, use the list comprehension and *input()* function to ask the user to enter the elements for both the matrices.
- Create a result matrix with the same dimension of both the matrices and keep its all element as 0.
- Using the Nested for loop, add the element of the first matrix with the other and store the result in the result matrix.
- Display the output.

Program	Output
<pre>rows = int(input("Enter the Number of rows : ")) column = int(input("Enter the Number of Columns: ")) print("Enter the elements of First Matrix:") matrix_a= [[int(input()) for i in range(column)] for i in range(rows)] print("First Matrix is: ") for n in matrix_a: print(n) print("Enter the elements of Second Matrix:") matrix_b= [[int(input()) for i in range(column)] for i in range(rows)]</pre>	<pre>Enter the Number of rows : 3 Enter the Number of Columns: 3 Enter the elements of First Matrix: 2 4 6 7 2 9 23 12 35 First Matrix is: [2, 4, 6] [7, 2, 9] [23, 12, 35]</pre>

<pre> for n in matrix_b: print(n) result=[[0 for i in range(column)] for i in range(rows)] for i in range(rows): for j in range(column): result[i][j] = matrix_a[i][j]+matrix_b[i][j] print("The Sum of Above two Matrices is : ") for r in result: print(r) </pre>	<p>Enter the elements of Second Matrix:</p> <p>6 20 10 14 15 28 29 40 11 [6, 20, 10] [14, 15, 28] [29, 40, 11] The Sum of Above two Matrices is : [8, 24, 16] [21, 17, 37] [52, 52, 46]</p>
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Matrices multiplication in python..

Program Steps to Multiply Two Matrices in Python

- Ask the user to enter the number of rows and columns for the first matrix.
- Enter the elements for the first matrix.
- Now ask the user to enter only the number of columns for the second matrix because the rows of the second matrix should be equal to the columns of the first matrix.
- Enter the elements for the second matrix.
- Use a nested loop inside a loop and perform the logic, **result [i][j]+=matrix_a[i][k]*matrix_b[k][j]**.

Program	Output
<pre> rows_a = int(input("Enter the Number of rows for the first matrix: ")) column_a = int(input("Enter the Number of Columns for the first matrix: </pre>	<p>Enter the Number of rows for the first matrix: 2</p> <p>Enter the Number of Columns for the first matrix: 3</p>

```

"))
print("Enter the elements of First
Matrix:")
matrix_a= [[int(input()) for i in
range(column_a)] for i in
range(rows_a)]
print("First Matrix is: ")
for n in matrix_a:
    print(n)
#the number of columns of first matrix
is equal to the number of rows of second
matrix
column_b = int(input("Enter the
Number of Columns for the second
matrix: "))

print("Enter the elements of Second
Matrix:")

matrix_b= [[int(input()) for i in
range(column_b)] for i in
range(column_a)]
for n in matrix_b:
    print(n)
result=[[0 for i in range(column_b)] for
i in range(rows_a)]

for i in range(len(matrix_a)):
    for j in range(len(matrix_b[0])):
        for k in range(len(matrix_b)):
            result
[i][j]+=matrix_a[i][k]*matrix_b[k][j]
print("\nMatrix_a X Matrix_b is: ")
for r in result:
    print(r)

```

Enter the elements of First Matrix:

1
2
3
4
5
6

First Matrix is:
[1, 2, 3]
[4, 5, 6]

Enter the Number of Columns for the second matrix: 2

Enter the elements of the Second Matrix:

7
8
9
10
11
12

[7, 8]
[9, 10]
[11, 12]

Matrix_a X Matrix_b is:

[58, 64]
[139, 154]

UNIT- 07**Write a Python program to check if a string is palindrome or not.****Program Steps..**

Step1: Enter string as an input.

Step2: Using string slicing we reverse the string and compare it back to the original string.

Step3: Then display the result.

Program	Output
<pre>My string=input("Enter string:") if(my string == my string[::-1]): print("The string is a palindrome") else: print("The string isn't a palindrome")</pre>	<p>Enter string: madam The string is a palindrome Enter string: python The string isn't a palindrome</p>

UNIT- 08**Write a Python program to Extract Unique values dictionary values.**

When it is required to extract unique values from a dictionary, a dictionary is created, and the 'sorted' method and dictionary comprehension is used.

Below is a demonstration for the same –

Explanation

- A dictionary is defined, and is displayed on the console.
- The values of the dictionary are accessed using the '.values' method.
- It is converted into a list, and is assigned to a variable.
- This is displayed as output on the console.

Program	Output
<pre>my_dict = {'hi' : [5,3,8, 0], 'there' : [22, 51, 63, 77], 'how' : [7, 0, 22], 'are' : [12, 11, 45], 'you' : [56, 31, 89, 90]} print("The dictionary is : ") print(my_dict) my_result = list(sorted({elem for val in my_dict.values() for elem in val})) print("The unique values are : ") print(my_result)</pre>	<p>The dictionary is : {'hi': [5, 3, 8, 0], 'there': [22, 51, 63, 77], 'how': [7, 0, 22], 'are': [12, 11, 45], 'you': [56, 31, 89, 90]}</p> <p>The unique values are : [0, 3, 5, 7, 8, 11, 12, 22, 31, 45, 51, 56, 63, 77, 89, 90]</p>

UNIT- 09

Write a Python program to read file word by word
Write a Python program to Get number of characters, words.

#program to read file word by word

The task is to open a file and read all the words of that file

Explanation

Approach:

1. Create a demo.txt file.

Example : Hello!Welcome TogoCoding!

Thi is an example of python file handling.

2. To open a file in python, in-built function open() is used, it takes two arguments: the file name or path and mode (i.e. 'r' for read, 'w' for write etc).
3. Read the lines of file and words using for loop and print the words.

Program	Output
<pre>with open('demo.txt','r') as txtfile: #Reading lines of file for readline in txtfile: #Read and print the words for str in readline.split(): print(str)</pre>	<pre>Hello! Welcome To goCoding! This is an example of python file handling</pre>

#Program to Get number of characters, words

Program	Output
<pre>file__IO ="D:\\Komal\\n1\\goeduhub\\python.txt" with open(file__IO, 'r') as f: data = f.read() line = data.splitlines() words = data.split() spaces = data.split(" ") charc = (len(data) - len(spaces)) print("\n Line number ::', len(line), '\n Words number ::', len(words), '\n Spaces ::', len(spaces), '\n Characters ::', (len(data)-len(spaces)))</pre>	<pre>Line number :: 4 Words number :: 29 Spaces :: 26 Characters :: 194</pre>

UNIT- 10**Write a Python program for Linear Search**

This is a Python program to implement linear search.

Problem Description

The program takes a list and key as input and finds the index of the key in the list using linear search.

Problem Solution

1. Create a function `linear_search` that takes a list and key as arguments.
2. A loop iterates through the list and when an item matching the key is found, the corresponding index is returned.
3. If no such item is found, -1 is returned.

Program Explanation

1. The user is prompted to enter a list of numbers.
2. The user is then asked to enter a key to search for.
3. The list and key is passed to `linear_search`.
4. If the return value is -1, the key is not found and a message is displayed, otherwise the index of the found item is displayed.

Program	Output
<pre>def linear_search(alist, key): """Return index of key in alist. Return -1 if key not present.""" for i in range(len(alist)): if alist[i] == key: return i return -1 alist = input('Enter the list of numbers: ') alist = alist.split() alist = [int(x) for x in alist] key = int(input('The number to search for: '))</pre>	<p>Runtime Test Cases</p> <p>Case 1:</p> <p>Enter the list of numbers: 5 4 3 2 1 10 11 2</p> <p>The number to search for: 1</p> <p>1 was found at index 4.</p>

```
index = linear_search(alist, key)
if index < 0:
    print('{} was not found.'.format(key))
else:
    print('{} was found at index
    {}'.format(key, index))
```

Case 2:

Enter the list of numbers: 5 2 1 5 -3

The number to search for: 2

2 was found at index 1.

Case 3:

Enter the list of numbers: 3 5 6

The number to search for: 2

2 was not found.
