



SAVEETHA SCHOOL OF ENGINEERING
SAVEETHA INSTITUTE OF MEDICAL AND SCIENCES
CHENNAI-602105
INSTITUTE OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE
DEPARTMENT OF DATA SCIENCE



Course code/Name: CSA08/ Python Programming

1. Write a python program using function to calculate the simple interest. Suppose the customer is a senior citizen. He is being offered 12 percentage rate of interest; for all other customers, the ROI is 10 percentage.

Sample Input:

Enter the principal amount: 200000

Enter the no of years: 3

Is customer senior citizen (y/n): n

Sample Output:

Interest: 60000

Test Cases:

1. Principal: 2000 , Years: 0
2. Principal: 20000 , Years: -2
3. Principal: -2000 , Years: 2
4. Principal: 2 , Years: 2000
5. Principal: 0 , Years: 5

2. Write a Python function sumsquare(l) that takes a nonempty list of integers and returns a list [odd,even], where odd is the sum of squares of all the odd numbers in l and even is the sum of squares of all the even numbers in l.

Sample Input:

Enter the number of elements:7

Enter the element: 18

Enter the element:9

Enter the element:1

Enter the element:12

Enter the element:13

Enter the element:4

Enter the element:30

Output:

[251,1384]

Test Cases:

1. 5, [1,2,3,4,5]
2. 8, [2,4,5,6,7,11,12,13]
3. -1, [12,10,11,1,2]
4. 0, [1,2,3,4,5]
5. -8, [2,4,5,6,7,11,12,13]

3. Maximum Number of Words Found in Sentences

A sentence is a list of words that are separated by a single space with no leading or trailing spaces. You are given a list of strings sentences, where each sentences[i] represents a single sentence. Write a python program to return the maximum number of words that appear in a single sentence

Test Cases:

1. Input: sentences = ["alice and bob love apple", "i think so too", "this is great thanks very much"]

Output: 6

2. Input: sentences = ["please wait", "continue to fight", "continue to win"]

Output: 3

3. ["the heads", "of", "two", "sorted linked lists"]

4. ["python", "is", "an object-oriented programming language"]

5. ["python", "is", "an interactive language"]

4. Given an integer x as numeric data type. Write a python program to return true if x is palindrome integer.

An integer is a **palindrome** when it reads the same backward as forward.

For example, 121 is a palindrome while 123 is not.

Test cases:

1. Input: x = 121

Output: true

Explanation: 121 reads as 121 from left to right and from right to left.

2. Input: x = -121

Output: false

Explanation: From left to right, it reads -121. From right to left, it becomes 121-. Therefore it is not a palindrome.

3. Input: x = 10

Output: false

Explanation: Reads 01 from right to left. Therefore it is not a palindrome.

4. x=abc

5. x=0

5. Write a python program to print the numbers from M to N by skipping K numbers in between? Get the input using list data type.

Sample Input:

M = 50

N = 100

K = 7

Sample Output:

50, 58, 66, 74,

Test cases:

1. M = 15, N = 05, K = 02

2. M = 25, N = 50, K = 04

3. M = 15, N = 100, K = -02

4. M = 0, N = 0, K = 2

5. M = 200, N = 200, K = 50

6. Most years have 365 days. However, the time required for the Earth to orbit the Sun is actually slightly more than that. As a result, an extra day, February 29, is included in some years to correct for this difference. Such years are referred to as leap years.

The rules for determining whether or not a year is a leap year follow:

Any year that is divisible by 400 is a leap year.

Of the remaining years, any year that is divisible by 100 is not a leap year.

Of the remaining years, any year that is divisible by 4 is a leap year.

All other years are not leap years.

Write a python program that reads a year from the user and displays a message indicating whether or not it is a leap year.

Sample Input:

Enter Date : 1947

Sample Output:

Given year is Non Leap Year

Leap Year: 1944

Test cases:

1. 19.47

2. 1936

3. 0

4. 2000

5. -1428

7. Write a python program to print the following pattern.

Sample Input:

Number of rows:5

Sample output:

1

2 1

3 2 1

4 3 2 1

5 4 3 2 1

Test cases:

1) 0

2) -1

3) 4.5

4) 6

5) 5

8. Merge Two Sorted Lists

You are given the heads of two sorted lists list1 and list2.

Constraints:

- The number of items in both lists is in the range [0, 50].
- Both list1 and list2 are sorted in non-decreasing order.

Test cases:

1. Input: list1 = [1,2,4], list2 = [1,3,4]

Output: [1,1,2,3,4,4]

2. Input: list1 = [], list2 = []

Output: []

3. Input: list1 = [], list2 = [0]

Output: [0]

4. list1=[],list2=[1,2,3,4,5]

5. list1=[0,1,9], list2=[3,4,5]

9. Write a python program for matrix addition using nested list?

Sample Input:

Mat1 = 1 2

5 3

Mat2 = 2 3

4 1

Sample Output:

Mat Sum = 3 5

9 4

Test Cases:

1. Mat1=[7,-1,5,4], Mat2=[2, 5 , 4, 3]
2. Mat1=[4,8,3,7], Mat2=[1,0,5,2]
3. Mat1=[4,8,3,7], Mat2=[1,0,5,2, 5, 6]
4. Mat1=[3,-4,8,5], Mat2=[9,-5,6,-6]
5. Mat1=[0,0],Mat2=[0,0,0,0]

10. The Project manager has to submit the project within a week period. He didn't find the proper combinations of team members to work on the project, Help him in finding the possible combinations available.

Write a python program to Accept 3 digits and find all the combinations

Sample Input:

123

Sample Output:

123

132

213

231

312

321

Test Cases:

1. 789
2. 1456
3. -856
4. 1001
5. 555

11. Write a python program that would sort a list of names in alphabetical order Ascending or Descending, choice get from the user?

Sample Input:

Banana

Carrot

Radish

Apple

Jack

Order(A/D) : A

Sample Output:

Apple

Banana

Carrot

Jack

Radish

Test cases:

1. Zebra, Abc, bank, apple, fruit

2. Quick, Brown, fox, lazy, dog
3. python, Python, program
4. red,yellow,green, blue, white
5. toys, car, bike, truck, Doll

12. Write a python program to print the number of vowels in the given string?

Sample Input:

Saveetha School of Engineering

Sample Output:

Number of vowels = 12

Test cases:

1. India is my country
2. All are my brothers and sisters
3. Why dry sky
4. Shy Try Cry
5. EDUCATION

13. Write a python program to find the square, cube of the given decimal number

Sample Input:

Given Number: 0.6

Sample Output:

Square Number: 0.36

Cube Number: 0.216

Test cases:

1. 12
2. 0
3. -0.5
4. 14.25
5. -296

14. Write a python program to find the number of student users in the college, get the total users, staff users details from the client. Note for every 3 staff user there is one Non-teaching staff user assigned by default.

Sample Input:

Total Users: 856

Staff Users: 126

Sample Output:

Student Users: 688

Test Cases:

1. Total User: 0
2. Total User: -143
3. Total User: 1026, Staff User: 1026
4. Total User: 450, Staff User: 540
5. Total User: 600, Staff User: 450

15. Write a python program to reverse a word using loop? (Not to use inbuilt functions)

Sample Input:

String: TEMPLE

Sample Output:

Reverse String: ELPMET

Test cases:

1. SIGN UP
2. AT-LEAST
3. 1245
4. !@#\$%
5. 145*999=144855

16. Write a python program to print the pattern

Enter the number of rows:4

0.1			
0.1	0.2		
0.1	0.2	0.3	
0.1	0.2	0.3	0.4

Test cases:

- 1) 0
- 2) -1
- 3) 4.5
- 4) 6
- 5) 5

17. How Many Numbers Are Smaller Than the Current Number. Given the list nums, for each nums[i] find out how many numbers in the list are smaller than it. That is, for each nums[i] you have to count the number of valid j's such that j != i and nums[j] < nums[i]. Return the answer in a list.

Test Cases:

1. Input: nums = [8,1,2,2,3]

Output: [4,0,1,1,3]

Explanation:

For nums[0]=8 there exist four smaller numbers than it (1, 2, 2 and 3).

For nums[1]=1 does not exist any smaller number than it.

For nums[2]=2 there exist one smaller number than it (1).

For nums[3]=2 there exist one smaller number than it (1).

For nums[4]=3 there exist three smaller numbers than it (1, 2 and 2).

2. Input: nums = [6,5,4,8]

Output: [2,1,0,3]

3. Input: nums = [7,7,7,7]

Output: [0,0,0,0]

4. nums=[1,2,3,5,5,6]

5. nums=[0,0,0,0]

17. Write a python program to find the Mean, Median, Mode of the list of elements?

Sample Input:;

List of elements = [16, 18, 27, 16, 23, 21, 19]

Sample Output:

Mean = 20

Median = 19

Mode = 16

Test cases:

1. List of elements = [26, 28, 37, 26, 33, 31, 29]
2. List of elements = [1.6, 1.8, 2.7, 1.6, 2.3, 2.1, .19]
3. List of elements = [0, 160, 180, 270, 160, 230, 210, 190, 0]
4. List of elements = [200, 180, 180, 270, 160, 270, 270, 190, 200]
5. List of elements = [100, 100, 100, 100, 100, 100, 100, 100, 100]

19. Write a python program to print consonants and vowels separately in the given string

Sample Input:

Given Word: Engineering

Sample Output:

Consonants: n g n r n g

Vowels: e i e ei

Test cases:

1. TRY
2. MEDIAN
3. ONE
4. KNOWLEDGE
5. EDUCATION

20. Write a python program to reverse a number using loop?(Get the input from user)

Sample Input:

Number: 14567

Sample Output:

Reverse Number: 76541

Test cases:

1. -45721
2. 000
3. AD1947
4. !@#\$%
5. 145*999=144855

21. Given a string s consisting of words and spaces, return *the length of the last word in the string*. A **word** is a maximal substring consisting of non-space characters only.

Test Case:

Input: s = "Hello World"

Output: 5

Input: s = " fly me to the moon "

Output: 4

Input: s = "luffy is still joyboy"

Output: 6

Input: s = "123"

Output: 3

Input: s = " 45&29 8*6^4"

Output: 5

22. Write a python program to print all the composite numbers between a and b?

Sample Input:

A = 12

B = 19

Sample Output

14, 15, 16, 18

Test cases:

1. A = 11, B = 11
2. A = 20, B = 10
3. A = 0, B = 0
4. A = -5, B = 5
5. A = 7, B = -12

23. In an organization they decide to give bonus to all the employees on New Year. A 5% bonus on salary is given to the grade A workers and 10% bonus on salary to the grade B workers. Write a python program to enter the salary and grade of the employee. If the salary of the employee is less than \$10,000 then the employee gets an extra 2% bonus on salary Calculate the bonus that has to be given to the employee and print the salary that the employee will get.

Sample Input & Output:

```
Enter the grade of the employee: B  
Enter the employee salary: 50000  
Salary=50000  
Bonus=5000.0  
Total to be paid:55000.0
```

Test cases:

1. Enter the grade of the employee: A
Enter the employee salary: 8000
2. Enter the grade of the employee: C
Enter the employee salary: 60000
3. Enter the grade of the employee: B
Enter the employee salary: 0
4. Enter the grade of the employee: 38000
Enter the employee salary: A
5. Enter the grade of the employee: B
Enter the employee salary: -8000

24. Write a python program to find the LCM and GCD of n numbers?

Sample Input:

```
N value = 2  
Number 1 = 16  
Number 2 = 20
```

Sample Output:

```
LCM = 80  
GCD = 4
```

Test cases:

1. N = 3, [12, 25, 30]
2. N = 2, [52, 25, 63]
3. N = 3, [17, 19, 11]
4. N = -2, [52, 60]
5. N = 2, [30, 45]

25. Write a python Program to find the frequency of each element in the list.

Sample Input & Output:

[1, 2, 8, 3, 2, 2, 2, 5, 1]	Element Frequency
-----------------------------	---------------------

1		2
2		4
8		1
3		1
4		1

Test Cases:

1. [9,10,8,3,4,5,9,8]
2. [1, 2, 4, 2, 5, 2, 5, 1]
3. [91,10,81,33,44,55,91,81,44]
4. [0.1,0.2,0.1,0.3,0.4,0.2,0.1]
5. [-1, -2, 4, -2, 5, 2, 5, -1]

26. Write a python program to calculate Pow(x,n), Add(x,n), Sub(x,n), Mul(x,n), Div(x,n)? Get the input and choice from the user.

Sample Input:

X = 2

N = 4

Choice : 2

Sample Output:

Add(X,N) = 6

Test cases:

1. X = 0 , N = 4
2. X = 5 , N = 0
3. X = -3 , N = 3
4. X = 0 , N = 0
5. X = 123, N = 123

27. Little Robert likes mathematics. Today his teacher has given him two integers and asked him to find out how many integers can divide both the numbers. Would you like to help him in completing his school assignment?

Test Cases:

1. Enter the numbers: 4, 12
- Output: 4
2. 4, 8
3. -10,0
4. 12,34
5. 16,17

28. Write a python program to count all the prime and composite numbers entered by the user.

Sample Input:

Enter the numbers

4

54

29

71

7

59

98

23

Sample Output:

Composite number:3

Prime number:5

Test cases:

1. 33, 41, 52, 61, 73, 90
2. TEN, FIFTY, SIXTY-ONE, SEVENTY-SEVEN, NINE
3. 45, 87, 09, 5.0 , 2.3, 0.4
4. -54, -76, -97, -23, -33, -98
5. 45, 73, 00, 50, 67, 44

29. Write a python program to find whether the person is eligible for vote or not. And if that particular person is not eligible, then print how many years are left to be eligible.

Sample Input:

Enter your age:

7

Sample output:

You are allowed to vote after 11 years

Test cases:

1. 25
2. Eighteen
3. 12
4. -18
5. 34.5

30. Write a python program to print the following pattern

Sample Input:

Enter the Character to be printed: %

Max Number of time printed: 3

%

%%

%%%

Test case:

1. 1,0
2. -1,-1
3. \$,5
4. ^,7
5. @,-1

31. Write a python program to print the given number is Perfect number or not?

Sample Input:

Given Number: 6

Sample Output:

Its a Perfect Number

Test cases:

1. 17

2. 26!

3. 143

4. 84.1

5.963

32. Write a python program to print the following pattern.

Enter the number of rows:4

1

2 3

4 5 6

7 8 9 10

Test cases:

1) 0

2) -1

3) 6

4) 0.2

5) 10

33. Write a python program to find the factorial of n?

Sample Input:

N = 4

Sample Output:

4 Factorial = 24

Test cases:

1. N = 0

2. N = -5

3. N = 1

4. N = Q

5. N = 3A

34. Write a python program to find the n^{th} odd number after n odd number

Sample Input:

N : 4

Sample Output:

4th Odd number after 4 odd numbers = 15

Test cases:

1. N = 0

2. N = -6

3. N = 2021

4. N = -14.5

5. N = -196

35. Write a python program to enter the marks of students in four subjects. Then calculate the total and aggregate, display the grade obtained by the student. If the student scores an aggregate greater than 75%, then the grade is distinction. If aggregate is $60 \geq$ and < 75 , then the grade if First Division. If aggregate is $50 \geq$ and < 60 , then the grade is second division. If

aggregate is $40 \geq$ and < 50 , then the grade is third division. Else the grade is fail.

Sample input & output

Enter the marks in python: 90

Enter the marks in c programming: 91

Enter the marks in Mathematics: 92

Enter the marks in physics : 93

Total : 366

Aggregate: 91.5

Distinction

Test cases:

1. 18,76,93,65
2. 73,78,79,65
3. 98,106,120,95
4. 96,73,-85,95
5. 78,59,8,76,79

36. Write a python program to arrange the letters of the word alphabetically in reverse order

Sample Input:

Enter the word : MOSQUE

Sample Output:

Alphabetical Order: U S Q O M E

Test Case:

1. HYPOTHECATION
2. MATRICULATION
3. MANIPULATION
4. SATISFACTION
5. DEDICATION

37. Write a python program to print the pattern

Enter the number of rows: 5

1

12

123

1234

12345

Test Case:

- 1) 0
- 2) -1
- 3) 6
- 4) 0.2
- 5) 10

38. Write a python program to convert the binary to decimal, octal, get the choice from the user.

Sample Input:

Given number:1101

Conversion(D/O):D

Sample output:

Decimal number: 13

Test cases:

1. 211,D
2. 1101,O
3. 22111,O
4. 111011.011,D
5. 101010,H

39. Write a python program to find the number of factors for n?

Sample input:

N=6

Sample output:

Number of factors for 6: 4

Test cases:

1. N=0
2. N=-5
3. N=1
4. N=20
5. N=3A

40. Write a program to Swap two numbers (1) with temp variable (2)without using temp variable (3) using tuple assignment.

Sample input:

A=4

B=6

After swapping A=6 B=4

Test cases:

1. A,0
2. 4,5
3. 7,-7
4. 0,0
5. 5,7