Week-2 Practice Assignment (Programming)

Problem-1

(1 marks)

Question

Evaluate the below piecewise function using Python.

$$y = \begin{cases} x + 2 & 0 < x < 10 \\ x^2 + 2 & 10 \leq x \\ 0 & otherwise \end{cases}$$

The value of the variable `x` should be an numerical input from the user.

Testcases

Public

Input	Output
5	7.0
15	227.0

Private

Input	Output
-100	0
0	0
7	9.0
10	102.0
128.3	16462.89

Answer

```
x = float(input())
if 0 < x < 10:
    y = x + 2
elif 10 <= x:
    y = x**2 + 2
else:
    y = 0
```

Solution

In this answer code, line 2 `if` statement covered the first condition of the piecewise function. If the first condition is not satisfied then line 4 `elif` statement will cover the second condition of the piecewise function otherwise line 6 `else` statement will cover the third condition of the piecewise function.

Tags

if, elif, piecewise

Problem-2

(2 marks)

Question

Write a Python code to find the quadrant of a point taken as input from the user. The input is given in 2 lines with the first and second lines representing the x coordinate and y coordinate of the point respectively. The possible outputs are I, II, III, IV, X-axis, Y-axis, and Origin. Any other output will not be accepted, Take care of the upper and lower cases while printing the output.

Testcases

Public

Sample Input-1

```
1
2
```

Sample Output-1

```
I
```

Sample Input-2

```
1.8
-1
```

Sample Output-2

```
IV
```

Private

Input-1

```
0.0
0
```

Output-1

```
Origin
```

Input-2

```
7.0
0
```

Output-2

```
X-axis
```

Input-3

```
0
-14.12
```

Output-3

```
Y-axis
```

Input-4

```
-3.2
-3
```

Output-4

```
X-axis
```

Input-5

```
0.1
0.98
```

Output-5

```
I
```

Input-6

```
1.2
-7.09
```

Output-6

```
IV
```

Input-7

```
-7.09
1.2
```

Output-7

```
II
```

Answer

```
x = float(input())
y = float(input())

if x > 0:
    if y > 0:
        print('I')
    elif y < 0:
        print('IV')
    else:
        print('X-axis')
elif x < 0:
    if y > 0:
        print('II')
    elif y < 0:
        print('III')
    else:
        print('X-axis')
else:
    if y != 0:
        print('Y-axis')
    else:
        print('Origin')
```

Solution

According to input of x and y value there are 7 possible cases to find the quadrant:-

x	y	output
positive	positive	I
positive	negative	IV
positive or negative	0	X-axis
negative	positive	II
negative	negative	III
0	positive or negative	Y-axis
0	0	Origin

These all cases are covered in answer code using `if-elif-else` statements.

Tags

Problem-3

(2 marks)

Question

Write a Python code to realize the equation of a line given 2 points (x_1, y_1) and (x_2, y_2). The input is in 5 lines where, the first, second, third, and fourth line represent x_1, y_1, x_2, and y_2 respectively. The fifth line corresponds to x_3. Determine y_3 using the line equation given below.

$$\frac{x - x_1}{x_2 - x_1} = \frac{y - y_1}{y_2 - y_1}$$

The output should be "Vertical Line" if the line is vertical. In other cases, the output should be 2 lined, where the first line is the value of y_3 and the second line indicates whether the slope of the line is positive or negative. Print "Positive Slope" and "Negative Slope" accordingly.

Testcases

Public

Sample Input - 1

```
1
2
1
6
5
```

Sample Output - 1

```
Vertical Line
```

Sample Input - 2

```
1
4
5
6
2
```

Sample Output - 2

```
4.5
Positive Slope
```

Private

Input-1

```
1
1
-1
5.3
0
```

Output-1

```
3.15
Negative Slope
```

Input-2

```
1
1
1
5.3
0
```

Output-2

```
Vertical Line
```

Input-3

```
5.3
1
1
1
0
```

Output-3

```
1.0
Horizontal Line
```

Input-4

```
5.3
1
1
0.5
0
```

Output-4

```
0.38372093023255816
Positive Slope
```

Answer

```
x1, y1 = float(input()), float(input())
x2, y2 = float(input()), float(input())
x3 = float(input())
if x1 != x2:
    m = (y2 - y1) / (x2 - x1)
    y3 = y1 + m * (x3 - x1)
    print(y3)
    if m == 0:
        print('Horizontal Line')
    elif m > 0:
        print('Positive Slope')
    else:
        print('Negative Slope')
else:
    print('Vertical Line')
```

Solution

For the vertical line, the slope will be infinity hence it will give zero division error. Hence, in order to avoid the error, the case is avoided and printed directly by checking for the equality of x_1 and x_2 values. After calculation of `m` use `if-elif-else` to print output.

Tags

if, else, elif

Problem-4

(2 marks)

Question

Accept a string and return a new string formed using the middle three characters. If the input string is of even length, make the string of odd length as below

- add a period `.` at the end if it is not there,
- otherwise remove the period `.`

Testcases

Public

Input

```
Peter Piper picked a peck of pickled peppers.
```

Output

```
pec
```

Input

```
floccinaucinihilipilification
```

Output

```
hil
```

Private

Input	Output
`Look before you leap`	`re`
`Readability counts.`	`ity`
`counting clocks`	`ng`
`Atoms make up everythings.`	`p e`

Answer

```
1  input_string = input("Enter a string: ")
2  length = len(input_string)
3  if length % 2 == 0:
4      if input_string[length - 1] == '.':
5          input_string = input_string[0 : length - 1]
6      else:
7          input_string = input_string + "."
8  middle_position = (length) // 2
9  output_string = input_string[middle_position - 1 : middle_position + 2]
10 print(output_string)
```

Solution

- After accepting input strings from the user find out the length of the string (line 1 to 2).
- If the length of the string is even then make this string of odd length by adding `.` or removing `.` according to the condition given in problem (line 3 to 7).
- Find the middle position and for middle three characters assign start index(middle_position - 1) and end index(middle_position + 2) in slice range (line 8 to 9).
- Print the output string(line 10).

Problem-5

(3 marks)

Question

Evaluate the output `d` based on three given Boolean inputs `a`, `b` and `c`.

a	**b**	**c**	***d***
False	False	False	*False*
False	False	True	*True*
False	True	False	*False*
False	True	True	*True*
True	False	False	*True*
True	False	True	*True*
True	True	False	*False*
True	True	True	*True*

Testcases

Public

Sample Input - 1

```
True
False
True
```

Sample Output - 1

```
True
```

Sample Input - 2

```
True
True
True
```

Sample Output - 2

```
True
```

Sample Input - 3

```
False
False
False
```

Sample Output - 3

```
False
```

Private

Input-1

```
False
False
False
```

Output-1

```
False
```

Input-2

```
False
False
True
```

Output-2

```
True
```

Input-3

```
False
True
False
```

Output-3

```
False
```

Input-4

```
False
True
True
```

Output-4

```
True
```

Input-5

```
True
False
False
```

Output-5

```
True
```

Input-6

```
True
False
True
```

Output-6

```
True
```

Input-7

```
True
True
False
```

Output-7

```
False
```

Input-8

```
True
True
True
```

Output-8

```
True
```

Answer

```
if input() == 'True':
    a = True
else:
    a = False
if input() == 'True':
    b = True
else:
    b = False
```

```
9  if input() == 'True':
10     c = True
11 else:
12     c = False
13 d = a and not(b) or c
14 print(d)
```

Solution

Accept the input from user `True` or `False` as string and assign to variable as bool by `if-else` statement (line 1 to 12) . Line 13 expression returns `True` or `False` value to variable `d` according to possible cases given in problem, then print value of `d` in line 14.

Tags