Rajalakshmi Engineering College

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NeoColab_REC_CS23221_Python Programming

REC_Python_Week 5_CY

Attempt : 1
Total Mark : 40
Marks Obtained : 37.5

Section 1 : Coding

1. Problem Statement

Alex is working with grayscale pixel intensities from an old photo that has been scanned in a single row. To detect edges in the image, Alex needs to calculate the differences between each pair of consecutive pixel intensities.

Your task is to write a program that performs this calculation and returns the result as a tuple of differences.

Input Format

The first line of input contains an integer n, representing the number of pixel intensities.

The second line contains n space-separated integers representing the pixel intensities.

Output Format

The output displays a tuple containing the absolute differences between consecutive pixel intensities.

Refer to the sample output for format specifications.

Sample Test Case

Input: 5
200 100 20 80 10
Output: (100, 80, 60, 70)

Answer

```python
# You are using Python
n = int(input())
pixels = list(map(int, input().split()))
differences = tuple(abs(pixels[i] - pixels[i + 1]) for i in range(n - 1))
print(differences)
```

Status : Correct   *Marks : 10/10*

2.   Problem Statement

Riya owns a store and keeps track of item prices from two different suppliers using two separate dictionaries. He wants to compare these prices to identify any differences. Your task is to write a program that calculates the absolute difference in prices for items that are present in both dictionaries. For items that are unique to one dictionary (i.e., not present in the other), include them in the output dictionary with their original prices.

Help Riya to implement the above task using a dictionary.

Input Format

The first line of input consists of an integer n1, representing the number of items in the first dictionary.

The next n1 lines contain two integers

1. The first line contains the item (key), and
2. The second line contains the price (value).

The following line consists of an integer n2, representing the number of items in the second dictionary

The next n2 lines contain two integers

1. The first line contains the item (key), and
2. The second line contains the price (value).

Output Format

The output should display a dictionary that includes:

1. For items common to both dictionaries, the absolute difference between their prices.
2. For items that are unique to one dictionary, the original price from that dictionary.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 1
4
4
1
8
7
Output: {4: 4, 8: 7}

Answer

```
# You are using Python
n1 = int(input())
dict1 = {int(input()): int(input()) for _ in range(n1)}

n2 = int(input())
dict2 = {int(input()): int(input()) for _ in range(n2)}
```

```
result = {}

for key in dict1:
    if key in dict2:
        result[key] = abs(dict1[key] - dict2[key])
    else:
        result[key] = dict1[key]

for key in dict2:
    if key not in dict1:
        result[key] = dict2[key]

print(result)
```

Status : Correct   *Marks : 10/10*

3.   Problem Statement

James is an engineer working on designing a new rocket propulsion
system. He needs to solve a quadratic equation to determine the optimal
launch trajectory. The equation is of the form $ax^2 + bx + c = 0$.

Your task is to help James find the roots of this quadratic equation.
Depending on the discriminant, the roots might be real and distinct, real
and equal, or complex. Implement a program to determine and display the
roots of the equation based on the given coefficients.

Input Format

The first line of input consists of an integer N, representing the number of
coefficients.

The second line contains three space-separated integers a, b, and c representing
the coefficients of the quadratic equation.

Output Format

The output displays:

1. If the discriminant is positive, display the two real roots.
2. If the discriminant is zero, display the repeated real root.

3. If the discriminant is negative, display the complex roots as a tuple with real and imaginary parts.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 3
1 5 6
Output: (-2.0, -3.0)

Answer

```python
import cmath

def find_roots(a, b, c):
    # Calculate the discriminant
    discriminant = b**2 - 4*a*c

    if discriminant > 0:
        # Two distinct real roots
        root1 = (-b + discriminant**0.5) / (2 * a)
        root2 = (-b - discriminant**0.5) / (2 * a)
        return (root1, root2)
    elif discriminant == 0:
        # One repeated real root
        root = -b / (2 * a)
        return (root,)
    else:
        # Complex roots
        real_part = -b / (2 * a)
        imaginary_part = (abs(discriminant)**0.5) / (2 * a)
        return ((real_part, imaginary_part), (real_part, -imaginary_part))

# Input reading
N = int(input())
if N != 3:
    print("Error: N must be 3.")
else:
    a, b, c = map(int, input().split())
```

```python
    # Find the roots
    roots = find_roots(a, b, c)

    # Output the result with parentheses
    if len(roots) == 1:
        print(f"({roots[0]},)")
    else:
        print(f"({roots[0]}, {roots[1]})")
```

Status : Partially correct   *Marks : 7.5/10*

4.   Problem Statement

Noah, a global analyst at a demographic research firm, has been tasked with identifying which country experienced the largest population growth over a two-year period. He has a dataset where each entry consists of a country code and its population figures for two consecutive years. Noah needs to determine which country had the highest increase in population and present the result in a specific format.

Help Noah by writing a program that outputs the country code with the largest population increase, along with the increase itself.

Input Format

The first line of input consists of an integer N, representing the number of countries.

Each of the following N blocks contains three lines:

1. The first line is a country code.
2. The second line is an integer representing the population of the country in the first year.
3. The third line is an integer representing the population of the country in the second year.

Output Format

The output displays the country code and the population increase in the format

{code: difference}, where code is the country code and difference is the increase in population.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 3
01
1000
1500
02
2000
2430
03
1500
3000
Output: {03:1500}

Answer

```python
# You are using Python
def find_largest_population_growth(n, data):
    max_increase = 0
    country_code = ""

    for i in range(n):
        code = data[i][0]
        population_year1 = data[i][1]
        population_year2 = data[i][2]

        # Calculate the population increase
        increase = population_year2 - population_year1

        # Check if this increase is the largest found so far
        if increase > max_increase:
            max_increase = increase
            country_code = code

    return f"{{{country_code}:{max_increase}}}"
```

```python
# Input reading
N = int(input())
data = []

for _ in range(N):
    code = input().strip()
    population_year1 = int(input().strip())
    population_year2 = int(input().strip())
    data.append((code, population_year1, population_year2))

# Find the country with the largest population growth
result = find_largest_population_growth(N, data)

# Output the result
print(result)
```

Status : Correct   *Marks : 10/10*