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# Institute of Computer Technology
# B. Tech Computer Science and Engineering

## Sub: Algorithm Analysis and Design

## Practical 1

**(1)** There are 2 chefs, namely chef 1 and chef 2 in the MasterChef competition. The judge is going to judge on the basis of 3 categories: presentation, taste and hygiene to prepare the dishes. The marking is scaling from 1 to 100. The rating for chef 1 challenge is the triplet a = (a[0], a[1], a[2]), and the rating for Chef 2 challenge is the triplet b = (b[0], b[1], b[2]), where 0 index is presentation, 1 index is taste and 2 index is hygiene.
The task is to find their comparison points by comparing a[0] with b[0], a[1] with b[1], and a[2] with b[2].

- If a[i] > b[i], then Chef 1 is awarded 1 point.
- If a[i] < b[i], then Chef 2 is awarded 1 point.
- If a[i] = b[i], then neither person receives a point.

Comparison points are the total points a person earned.
Given a and b, determine their respective comparison points.
Design the algorithm for the same and implement using the programming language of your choice.
Make comparative analysis for various use cases & input size.

**Sample Input 1**
27 48 70
89 26 7
**Sample Output 1**
2 1
**Explanation 1**
Comparing the 0th elements, 27<89 so Chef 2 receives a point.
Comparing the 1st and 2nd elements, 48>26 and 70>7 so Chef 1 receives two points.
The return array is [2,1].

**CODE:**

**.py File**

```
# to create virtual environment : python -m venv venv
# to activate virtual environment : .\venv\Scripts\activate
# to run : python filename.py


from flask import Flask, render_template, request

app = Flask(__name__)

# Define a function to calculate comparison points
def compare_points(a, b):
    points_chef1 = 0
    points_chef2 = 0

    for i in range(3):  # Since there are 3 categories
        if a[i] > b[i]:
            points_chef1 += 1
        elif a[i] < b[i]:
            points_chef2 += 1

    return points_chef1, points_chef2

@app.route('/', methods=['GET', 'POST'])
def index():
    if request.method == 'POST':
        a_presentation = int(request.form['a_presentation'])
        a_taste = int(request.form['a_taste'])
        a_hygiene = int(request.form['a_hygiene'])

        b_presentation = int(request.form['b_presentation'])
        b_taste = int(request.form['b_taste'])
        b_hygiene = int(request.form['b_hygiene'])

        # Create tuples for ratings of Chef 1 and Chef 2
        a = (a_presentation, a_taste, a_hygiene)
        b = (b_presentation, b_taste, b_hygiene)

        # Calculate comparison points
        points_chef1, points_chef2 = compare_points(a, b)
```

```
        return render_template('result.html', points_chef1=points_chef1,
points_chef2=points_chef2)

    return render_template('index.html')

if __name__ == '__main__':
    app.run(debug=True)
```

**.html file for html form:**

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Compare Chef Ratings</title>

    <style>
        body {
            font-family: Arial, sans-serif;
            background-color: #f0f0f0;
        }

        .container {
            max-width: 1100px;
            margin: 35px auto;
            background-color: #ffffff;
            padding: 20px;
            border-radius: 15px;
        }

        .heading{
            text-align: center;
            background-color: #000000;
            color: #ffffff;
            padding: 10px;
            border-radius: 5px;
            margin-bottom: 20px;
        }
        .form-group {
            margin-bottom: 15px;
        }

        .form-group label {
```

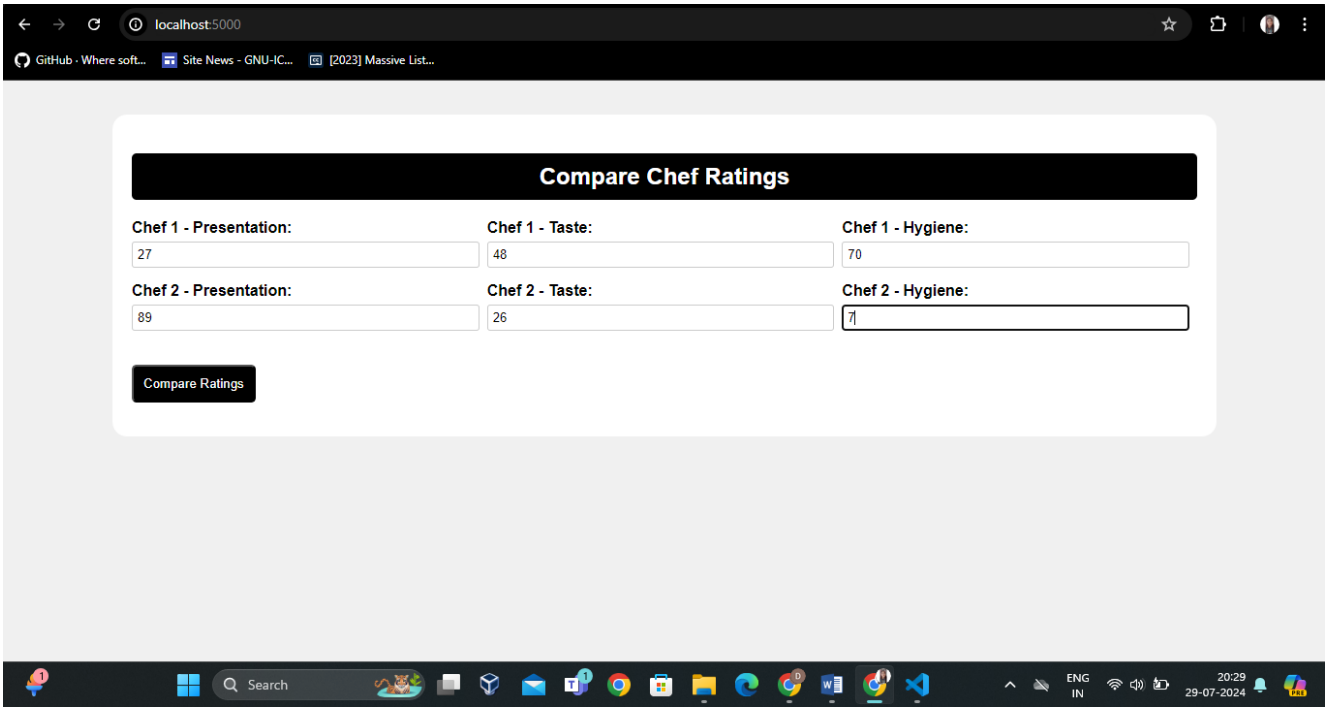
```
            display: block;
            font-weight: bold;
            margin-bottom: 5px;
        }

        .form-group input[type="text"] {
            width: calc(100% - 20px);
            padding: 5px;
            border: 1px solid #ccc;
            border-radius: 3px;
        }

        .form-group input[type="submit"] {
           background-color: #000000;
           color: #ffffff;
           padding: 10px;
           border-radius: 5px;
           margin-top: 20px;

        }

        .row {
            display: flex;
            justify-content: space-between;
        }

        .col {
            flex: calc(33% - 10px);
        }
    </style>
</head>
<body>
    <div class="container">
        <h2 class="heading">Compare Chef Ratings</h2>

        <form method="POST">
            <div class="form-group">
                <div class="row">
                    <div class="col">
                        <label for="a_presentation">Chef 1 -
Presentation:</label>
                        <input type="text" id="a_presentation"
name="a_presentation" required>
                    </div>
                    <div class="col">
```

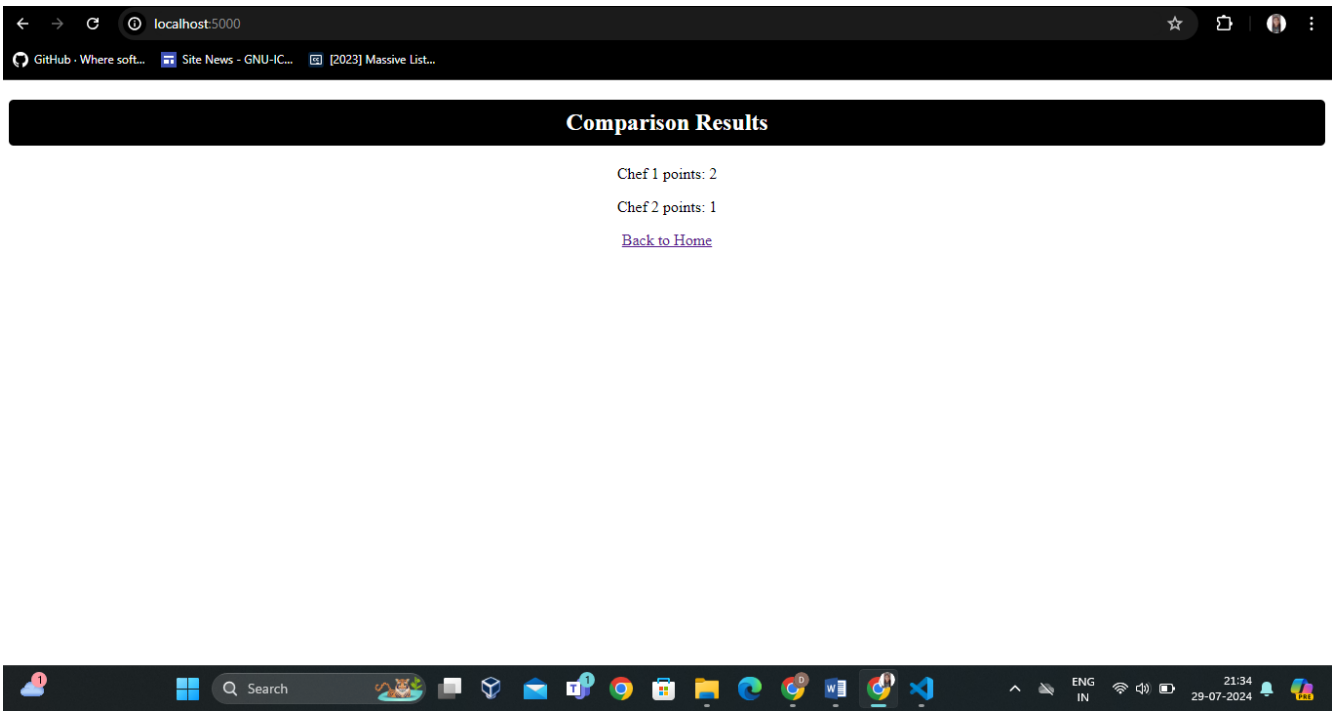
```
                        <label for="a_taste">Chef 1 - Taste:</label>
                        <input type="text" id="a_taste" name="a_taste" required>
                    </div>
                    <div class="col">
                        <label for="a_hygiene">Chef 1 - Hygiene:</label>
                        <input type="text" id="a_hygiene" name="a_hygiene"
required>
                    </div>
                </div>
            </div>

            <div class="form-group">
                <div class="row">
                    <div class="col">
                        <label for="b_presentation">Chef 2 -
Presentation:</label>
                        <input type="text" id="b_presentation"
name="b_presentation" required>
                    </div>
                    <div class="col">
                        <label for="b_taste">Chef 2 - Taste:</label>
                        <input type="text" id="b_taste" name="b_taste" required>
                    </div>
                    <div class="col">
                        <label for="b_hygiene">Chef 2 - Hygiene:</label>
                        <input type="text" id="b_hygiene" name="b_hygiene"
required>
                    </div>
                </div>
            </div>

            <div class="form-group">
                <input type="submit" value="Compare Ratings">
            </div>
        </form>
    </div>
</body>
</html>
```

**.html file for displaying result.**

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Comparison Results</title>
    <style>
        .heading{
            text-align: center;
            background-color: #000000;
            color: #ffffff;
            padding: 10px;
            border-radius: 5px;
        }

        .para{
            text-align: center;

        }
    </style>
</head>
<body>
    <h2 class="heading">Comparison Results</h2>
    <div class="para">
    <p>Chef 1 points: {{ points_chef1 }}</p>
    <p>Chef 2 points: {{ points_chef2 }}</p>
    <a  href="/">Back to Home</a>
    </div>
</body>
</html>
```

## OUTPUT:


localhost:5000
GitHub - Where soft...
Site News - GNU-IC...
[2023] Massive List...
Compare Chef Ratings
Chef 1 - Presentation:
27
Chef 1 - Taste:
48
Chef 1 - Hygiene:
70
Chef 2 - Presentation:
89
Chef 2 - Taste:
26
Chef 2 - Hygiene:
7
Compare Ratings
Search
ENG
IN
20:29
29-07-2024


localhost:5000
GitHub - Where soft...
Site News - GNU-IC...
[2023] Massive List...
Comparison Results
Chef 1 points: 2
Chef 2 points: 1
Back to Home
Search
ENG
IN
21:34
29-07-2024

**(2)** Let us suppose that you are having an array containing both positive and negative numbers. Given the numbers you are supposed to find 2 such elements such that the sum of those numbers is closest to zero.

**Sample Input 1**
15, 5, -20, 30, -45

**Sample Output 1**
15, -20

**Explanation 1**
In all the comparison, the sum of 15 and -20 is smallest amount among all other comparison.

**Sample Input 2**
15, 5, -20, 30, 25

**Sample Output 2**
15, -20 & -20, 25

**Explanation 2**
In all the comparison, the sum of 15,-20 & -20, 25 is smallest amount among all other comparison.

**CODE:**

**.py file:**

```
from flask import Flask, render_template, request

app = Flask(__name__)

def closest_pairs_sum(numbers):
    min_sum = float('inf')
    closest_pairs = []

    n = len(numbers)
    # Generate all possible Pair
    for i in range(n):
        for j in range(i + 1, n):
            pair = (numbers[i], numbers[j])
            current_sum = sum(pair)
            if abs(current_sum) < abs(min_sum):
                # if true it will update sum and reset the value of min sum
                min_sum = current_sum
                closest_pairs = [pair]
```

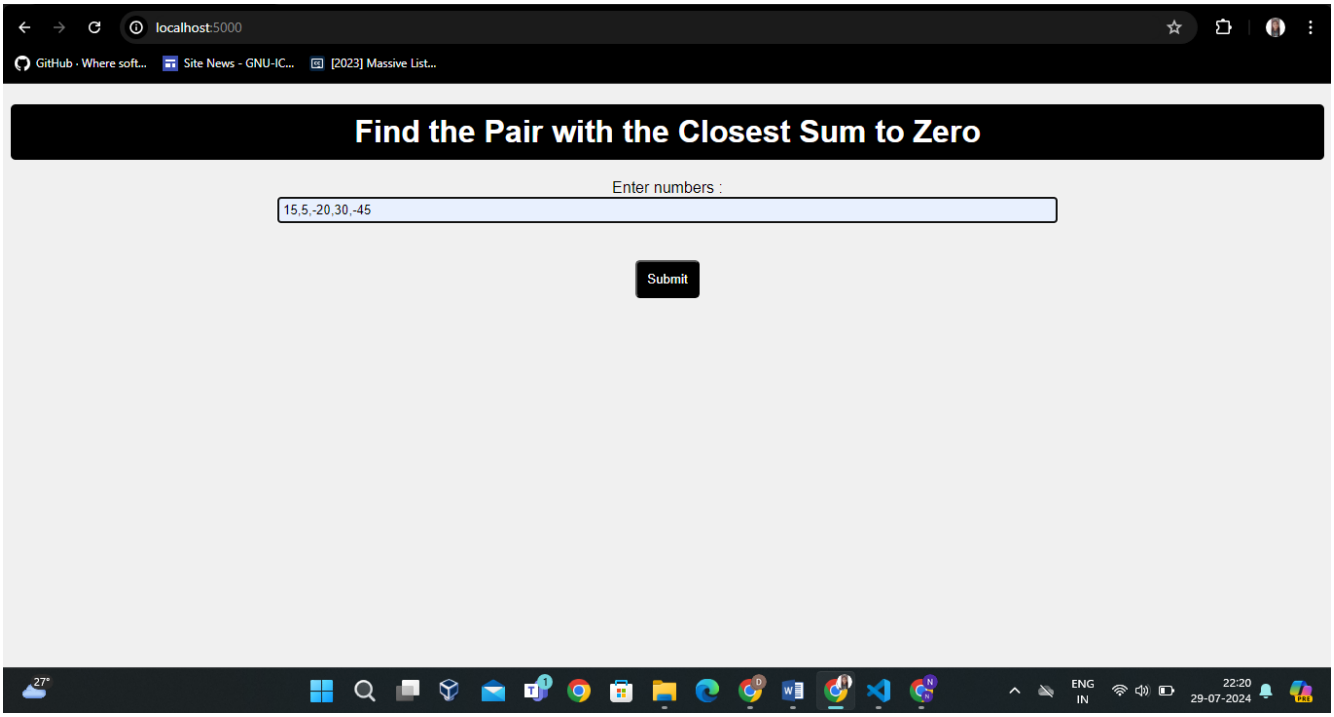
```
                # else if it will append the pair into closest_pair array
            elif abs(current_sum) == abs(min_sum):
                closest_pairs.append(pair)

    return closest_pairs

@app.route('/', methods=['GET', 'POST'])
def index():
    result = None
    if request.method == 'POST':
        try:
            input_string = request.form['numbers']
            # store the string input into list
            numbers = list(map(int, input_string.split(',')))
            pairs = closest_pairs_sum(numbers)
            # to print the pairs and join the string pairs also fomatting the
pairs.
            result = ' & '.join([f'{p[0]}, {p[1]}' for p in pairs])
        except ValueError:
            result = 'Invalid input. Please enter a comma-separated list of
numbers.'

    return render_template('array.html', result=result)

if __name__ == '__main__':
    app.run(debug=True)
```

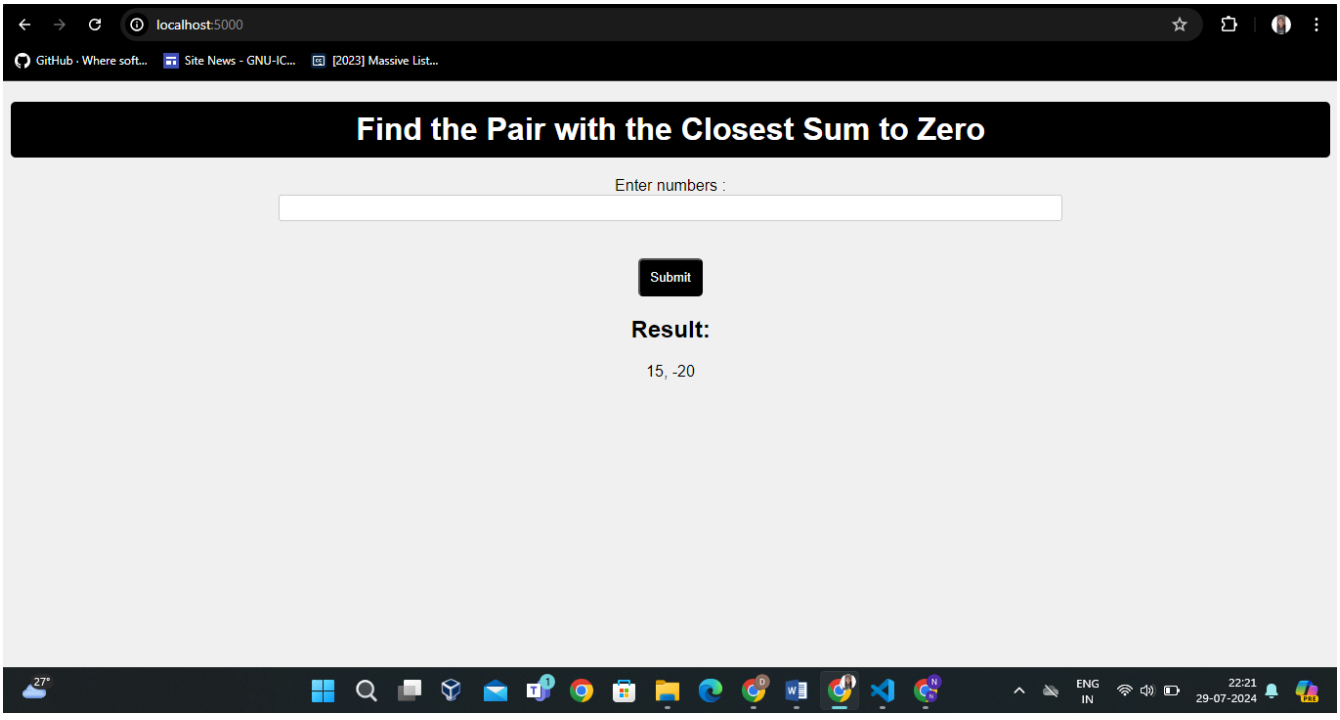
**.html file:**

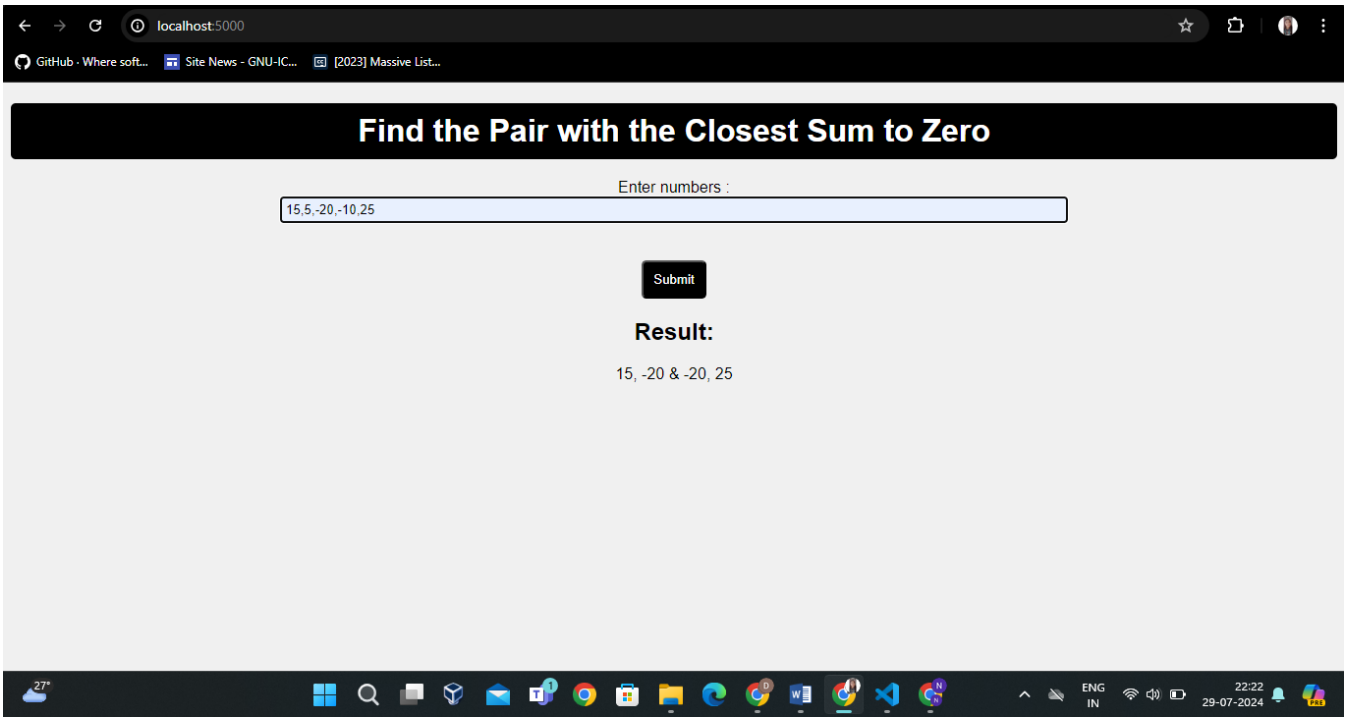
```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Closest Pair Sum</title>
    <style>
        body {
            font-family: Arial, sans-serif;
            background-color: #f0f0f0;
            text-align: center;
        }

        .heading{
            text-align: center;
```

```
            background-color: #000000;
            color: #ffffff;
            padding: 10px;
            border-radius: 5px;
            margin-bottom: 20px;
        }

        .form-group input[type="text"] {
            width: calc(60% - 20px);
            padding: 5px;
            border: 1px solid #ccc;
            border-radius: 3px;
        }

        .form-group input[type="submit"] {
            background-color: #000000;
            color: #ffffff;
            padding: 10px;
            border-radius: 5px;
            margin-top: 20px;

         }


    </style>
</head>
<body>

    <h1 class="heading">Find the Pair with the Closest Sum to Zero</h1>
    <div class="form-group">
    <form method="post">
        <label for="numbers">Enter numbers : </label><br>
        <input type="text" id="numbers" name="numbers" required><br><br>
        <input type="submit" value="Submit">
    </form>

    {% if result %}
        <h2>Result:</h2>
        <p>{{ result }}</p>
    {% endif %}
</div>
</body>
</html>
```

**OUTPUT:**


localhost:5000
GitHub · Where soft...
Site News - GNU-IC...
[2023] Massive List...
Find the Pair with the Closest Sum to Zero
Enter numbers :
15,5,-20,30,-45
Submit


localhost:5000
GitHub · Where soft...
Site News - GNU-IC...
[2023] Massive List...
Find the Pair with the Closest Sum to Zero
Enter numbers :
Submit
Result:
15, -20


localhost:5000
GitHub - Where soft...
Site News - GNU-IC...
[2023] Massive List...
Find the Pair with the Closest Sum to Zero
Enter numbers :
15,5,-20,-10,25
Submit
Result:
15, -20 & -20, 25
27°
ENG
IN
22:22
29-07-2024