CSE 111 Bütünleme

Olcay Taner YILDIZ, Ayşegül TÜYSÜZ ERMAN

I. QUESTION (15 POINTS)

Write a method named $groceries$ that accepts as its parameter an integer N that represents the number of items in a shopping list. In the method, you should ask user to enter grocery items purchased along with their price and their discount category. Your method should compute and return a double representing the total cost of the grocery items. For each item, you should ask user to enter the name of the item followed by its discount category ("red", "blue" or "none") followed by its full price. The different discount options are: *red*: 10% off full price, *blue*: 25% off full price, *none*: full price A possible output with a shopping list of 4 items is as follows:

```
Name? Avocado
Discount? Red
Price? 1.0

Name? Blueberries
Discount? None
Price? 5.0

Name? Milk
Discount? Blue
Price? 2.0

Name? Cream
Discount? Red
Price? 1.0
```

The call on $groceries(4)$ with the previous inputs should return 8.30. The avocado will cost 0.9 because a discount of 10% off of 1 is 0.1. Blueberries cost the full price of 5. Milk will cost 1.50 because it receives a discount of 25% off of 2.00. Cream will cost 0.9. The total is $0.9 + 5 + 1.5 + 0.9 = 8.30$.

II. QUESTION (20 POINTS)

Write a method named $findMostValuable$ that takes a matrix (2D array) and an integer N as parameters. The method finds and returns the most valuable (having maximum sum) contiguous sub 2D array with size $N \times N$ of the given matrix.

III. QUESTION (15 POINTS)

Write a method named $repeatedSequence$ that accepts two arrays of integers $a1$ and $a2$ as parameters and returns $true$ if $a2$ is composed entirely of repetitions of $a1$ and $false$ otherwise. For example, if $a1$ stores the elements $\{2, 1, 3\}$ and $a2$ stores the elements $\{2, 1, 3, 2, 1, 3, 2, 1, 3\}$, the method would return $true$. If the length of $a2$ is not a multiple of the length of $a1$, your method should return $false$. You may assume that both arrays passed to your method will have a length of at least 1. The following examples show some calls to your method and their expected results:

```
int[] a1 = {23};
int[] a2 = {23, 23, 23, 23};
repeatedSequence(a1, a2) returns true

int[] a3 = {5, 6, 7, 8};
int[] a4 = {5, 6, 7, 8};
repeatedSequence(a3, a4) returns true

int[] a5 = {5, 6};
int[] a6 = {5, 6, 7, 5, 6, 5};
repeatedSequence(a5, a6) returns false
```

IV. QUESTION (15 POINTS)

Write a method that takes a matrix as parameter (2 dimensional array) and returns true if the matrix is a row increasing matrix, false otherwise. A matrix is row increasing if the numbers in each row are in increasing order.

V. QUESTION (15 POINTS)

Write a recursive method

```
int aBeforeB(String s)
```

which returns the number of 'a' characters preceding a 'b' character in the string s.

VI. QUESTION (20 POINTS)

Write a method that reads N points (p_x, p_y) in the 2-d euclidian space and returns the number of points whose distance to the center those N points is greater than M. Center of N points (m_x, m_y) is calculated as:

$$m_x = \frac{\sum_{i=1}^{N} p_x}{N}$$

.

$$m_y = \frac{\sum_{i=1}^{N} p_y}{N}$$

. The distance between two points p and q in 2-d space is calculated as

$$d(p, q) = \sqrt{(p_x - q_x)^2 + (p_y - q_y)^2}$$

Your method should use the following methods
- a method to calculate the distance between two points
- a method to calculate the center of N points

which must also be implemented.