Mr. Bellavia

ASSIGNMENT 01 - PROBLEM SOLVING

IMPORTANT: Before submission, make a copy of your **'Program.cs'** file for each question and then rename each file to the following:

File Names:

- *last_name_first name*_U3_A01_1.cs
- *last_name_first name*_U3_A01_2.cs
- *last_name_first name*_U3_A01_3.cs

> **Note**: Along with last name and first name, make sure the end of the filename (i.e., before the **.cs**) has the **unit number**, **exercise number**, and **question number.** For example:

<center>smith_<i>john</i>_<i>U1</i>_<i>E03</i>_<i>2</i>.cs</center>

Problem 1: Server Delay

Problem Description:

A company administration website is being hosted on 3 different servers (A, B, and C) on the internet. Each server is in a different geographical location. This website is accessed by the company from a single location. When an employee accesses the website, they are randomly connected to any server (A, B, or C). The roundtrip time is the duration in milliseconds (ms) it takes for a network to go from a starting point (employee computer) to a destination (server A, B, or C) and back to the starting point (employee computer). The servers hosting the company website have the following average roundtrip times:

- Server A – 98ms
- Server B – 150ms
- Server C – 114ms

Each employee connects to only one server per day that is randomly chosen. The total roundtrip time for a particular server on a given day can be calculated by multiplying the server roundtrip time by the number of employees connected that day.

The roundtrip time of all servers for a given day can then be added together to give a total roundtrip time.

Write a program that determines which company workday has the lowest total roundtrip time between 2 workdays.

Input Specification:

The first three lines represent the total number of connected users for each server for day 1, and the next three lines represent the total number of connected users for each server for day 2.

Output Specification:

The output will be the day number with the smallest total roundtrip time. If the roundtrip times are the same, then the output will be 'Same'.

Sample Input 1:

```
33
42
23
24
18
40
```

Sample Output 1:

```
Day 2
```

Explanation:

Day 1 had a total roundtrip time of 33 x 98 + 42 * 150 + 23 * 114 = 12,156ms, day 2 had a total roundtrip time of 24 * 98 + 18 * 150 + 40 * 114 = 9,612ms, therefore day 2 had the lower total roundtrip time.

Sample Input 2:

```
21
5
28
0
40
0
```

Sample Output 2:

```
Same
```

Problem 2: Series Winner

Problem Description:

In basketball we know that there can be 3-point shots, 2-point field goals, and 1-point free throws. A series in the playoffs between two teams are done with a best of 5 series. Your job is to determine the winner of a series between two teams.
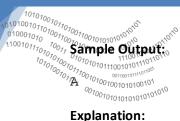
Input Specification:

The first line is an integer N, representing the number of games that were played in a best of 5 series between team A and team B. N cannot be less than 3 or greater than 5 (i.e., best of 5 series). The following lines are in groups of 6 representing the scores of a game where the first 3 lines of a group represent team A, and the next 3 lines of a group represent team B. The 3 scores for a team in a game have the following breakdown: the first line contains the number of successful 3-point shots, the second line contains the number of successful 2-point field goals, and the third line contains the number of successful 1-point free throws.

Output Specification:

The output will be a single character indicating which team (A or B) won the best of 5 series.

Sample Input:
4
9
8
5
5
12
3
12
7
4
4
9
8
8
6
0
6
6
8
10
10
4
8
8
4

Sample Output:

A

Explanation:

4 games were played. Team A's total for each game played: 48 (9 x 3 + 8 x 2 + 5), 54 (12 x 3 + 7 x 2 + 4), 36 (8 x 3 + 6 x 2 + 0), and 54 (10 x 3 + 10 x 2 + 4). Team B's total for each game played: 42 (5 x 3 + 12 x 2 + 3), 38 (4 x 3 + 9 x 2 + 8), 38 (6 x 3 + 6 x 2 + 8), 44 (8 x 3 + 8 x 2 + 4). Out of the 4 games, Team A won 3 and Team B won 1, therefore Team A won the best of 5 series.

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(OPTIONAL) Problem 3: Water Reserve

Problem Description:

A rain barrel gathers water from rain and is usually connected to an ease trough at the side of a house or a shed. The total harvest of rainwater that a rain barrel can gather (in gallons) is calculated with the following formula:

Total Harvested Rainwater (g) = Rainfall Depth (in) x Catchment Area (ft^2) x 0.623 x System % Efficiency

Write a program that determines how many days of rain it takes to fill a rain barrel.

Input Specification:

The first line represents the size of the barrel in gallons (integer value). The second line represents the square feet of the catchment area (integer value). The third line represents the efficiency of the system (a decimal value representing a percentage). The remaining lines represent a sequence of days where each line is the amount of rainfall that fell that day (decimal value). The last line will always be -1 signifying the end of the sequence of days for gathering rain.

Output Specification:

The output will be the number of days it took for the rain bucket to fill up. If the rain bucket does not fill up by the end of the sequence of given days, then the output will be '0'.

Sample Input:

```
20
20
0.95
0.1
1.3
0
0.55
1.6
0.3
-1
```

Sample Output:

```
4
```

Explanation:

Each day is calculated with the formula and the total is accumulated:

- Day 1 Harvest   = 0.1 * 20 * 0.623 * .95

= 1.1837

TOTAL   = 1.1837

- Day 2 Harvest   = 1.3 * 20 * 0.623 * .95

= 15.3881

TOTAL   = 1.1837 + 15.3881

= 16.5718

- Day 3 Harvest   = 0

TOTAL   = 16.5718 + 0

= 16.5718

- Day 4 Harvest   = 0.55 * 20 * 0.623 * .95

= 6.51035

TOTAL   = 16.5718 + 6.51035

= 23.08215

Therefore, it took 4 days to fill the rain barrel.

Sample Input:

```
15
10
1.0
0.05
0
1.0
.1
-1
```

Sample Output:

```
0
```