DEALERON

Development Candidate
// Coding Test

Thank you for your interest in joining the DealerOn Development team. Please read all three problem descriptions in this document thoroughly, then write a program to solve only ONE of them. If you choose to do more than one problem, *we will choose and evaluate only one of your solutions.*

We are a C# .NET and TypeScript team and we strongly prefer you use C# for your solution if you're applying for a Full-stack position or TypeScript if you're applying specifically for Front-End. However, Java is acceptable if you're not applying for a senior position and feel that it better displays your skills.

Your code submission must . . .

. . . include a brief explanation of your design and assumptions along with your code.

. . . compile and run without us needing to do anything more than a package restore.

. . . be yours. You may use third-party libraries, but we will only evaluate code that you have written.

. . . give the correct answer. Your output should match our expected outputs as closely as possible. Showing us unit tests are a plus!

. . . show us your preferences and style for well-structured codebase. Avoid single-file submissions.

. . . allow custom input. Don't hard-code the sample input into your program without giving the ability to enter our own input. You may use any mechanism to accept user input.

. . . not be sloppy or cumbersome. Neatness and readability count!

How to submit your code

You can email us a link to a public Github repository of your solution, or attach a zip file containing your project source files to code@dealeron.com. Don't include .exe, .msi, .dll or other binary files.

There's no time limit for submitting your solution, however for most successful candidates, 4-8 total hours of effort is appropriate. If you have any questions about the code test as it relates to your interview process, please contact us at code@dealeron.com.

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PROBLEM ONE

Mars Rovers

NASA intends to land robotic rovers on Mars to explore a particularly curious-looking plateau. The rovers must navigate this rectangular plateau in a way so that their on board cameras can get a complete image of the surrounding terrain to send back to Earth.

A simple two-dimensional coordinate grid is mapped to the plateau to aid in rover navigation. Each point on the grid is represented by a pair of numbers X Y which correspond to the number of points East or North, respectively, from the origin. The origin of the grid is represented by 0 0 which corresponds to the southwest corner of the plateau. 0 1 is the point directly north of 0 0, 1 1 is the point immediately east of 0 1, etc. A rover's current position and heading are represented by a triple X Y Z consisting of its current grid position X Y plus a letter Z corresponding to one of the four cardinal compass points, N E S W. For example, 0 0 N indicates that the rover is in the very southwest corner of the plateau, facing north.

NASA remotely controls rovers via instructions consisting of strings of letters. Possible instruction letters are L, R, and M. L and R instruct the rover to turn 90 degrees left or right, respectively (without moving from its current spot), while M instructs the rover to move forward one grid point along its current heading.

Your task is write an application that takes the test input (instructions from NASA) and provides the expected output (the feedback from the rovers to NASA). Each rover will move in series, i.e. the next rover will not start moving until the one preceding it finishes.

INPUT

Assume the southwest corner of the grid is 0,0 (the origin). The first line of input establishes the exploration grid bounds by indicating the coordinates corresponding to the northeast corner of the plateau.

Next, each rover is given its instructions in turn. Each rover's instructions consists of two lines of strings. The first string confirms the rover's current position and heading. The second string consists of turn / move instructions.

OUTPUT

Once each rover has received and completely executed its given instructions, it transmits its updated position and heading to NASA.

TEST INPUT

```
5 5
1 2 N
LMLMLMLMM
3 3 E
MMRMMRMRRM
```

EXPECTED OUTPUT

```
1 3 N
5 1 E
```

There's no time limit for submitting your solution, submissions will be reviewed in batches throughout the week.

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PROBLEM TWO

Sales Taxes

There are a variety of items for sale at a store. When a customer purchases items, they receive a receipt. The receipt lists all of the items purchased, the sales price of each item (with taxes included), the total sales taxes for all items, and the total sales price.

Basic sales tax applies to all items at a rate of 10% of the item's list price, with the exception of books, food, and medical products, which are exempt from basic sales tax. An import duty (import tax) applies to all imported items at a rate of 5% of the shelf price, with no exceptions.

Write an application that takes input for shopping baskets and returns receipts in the format shown below, calculating all taxes and totals correctly. When calculating the sales tax, round the value up to the nearest 5 cents. For example, if a taxable item costs $5.60, an exact 10% tax would be $0.56, and the final price after adding the rounded tax of $0.60 should be $6.20.

INPUT 1

```
1 Book at 12.49
1 Book at 12.49
1 Music CD at 14.99
1 Chocolate bar at 0.85
```

OUTPUT 1

```
Book: 24.98 (2 @ 12.49)
Music CD: 16.49
Chocolate bar: 0.85
Sales Taxes: 1.50
Total: 42.32
```

INPUT 2

```
1 Imported box of chocolates at 10.00
1 Imported bottle of perfume at 47.50
```

OUTPUT 2

```
Imported box of chocolates: 10.50
Imported bottle of perfume: 54.65
Sales Taxes: 7.65
Total: 65.15
```

INPUT 3

```
1 Imported bottle of perfume at 27.99
1 Bottle of perfume at 18.99
1 Packet of headache pills at 9.75
1 Imported box of chocolates at 11.25
1 Imported box of chocolates at 11.25
```

OUTPUT 3

```
Imported bottle of perfume: 32.19
Bottle of perfume: 20.89
Packet of headache pills: 9.75
Imported box of chocolates: 23.70 (2 @ 11.85)
Sales Taxes: 7.30
Total: 86.53
```

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PROBLEM THREE

Trains

You have been tasked to help the Kiwiland railroad provide information about its routes to its customers, in particular: route distance, number of unique routes between two towns, and the shortest route between two towns. In Kiwiland, all train routes are one-way, and round trip routes may or may not exist. For example, just because there is a route from town A to B does not mean there is necessarily a route from B to A. In fact, if both routes happen to exist, each route should be considered unique (and may even have different distances)!

Use a directed graph to represent the train routes. A node represents a town and an edge represents a route between two towns. The edge weight represents route distance. No route appears more than once in the input, and for any given route, the starting and ending town will never be the same town (e.g., there are no routes from A to A).

INPUT

For the test input, the towns are named using the first few letters of the alphabet from A to E. A route between two towns A to B with a distance of 5 is represented as AB5.

OUTPUT

Given the test inputs, calculate the following:

1. The distance of the route A-B-C.
2. The distance of the route A-D.
3. The distance of the route A-D-C.
4. The distance of the route A-E-B-C-D.
5. The distance of the route A-E-D.
6. The number of trips starting at C and ending at C with a maximum of 3 stops. In the test input, there are two such trips: C-D-C (2 stops). and C-E-B-C (3 stops).
7. The number of trips starting at A and ending at C with exactly 4 stops. In the test input, there are three such trips: A to C (via B,C,D); A to C (via D,C,D); and A to C (via D,E,B).
8. The length of the shortest route (in terms of distance to travel) from A to C.
9. The length of the shortest route (in terms of distance to travel) from B to B.
10. The number of different routes from C to C with a distance of less than 30. In the test input, the trips are: CDC, CEBC, CEBCDC, CDCEBC, CDEBC, CEBCEBC, CEBCEBCEBC.

For items 1 through 5, if no such route exists, output 'NO SUCH ROUTE'. Otherwise, follow the route as given; do not make any extra stops!

TEST INPUT

```
AB5, BC4, CD8, DC8, DE6,
AD5, CE2, EB3, AE7
```

EXPECTED OUTPUT

```
Output #1: 9
Output #2: 5
Output #3: 13
Output #4: 22
Output #5: NO SUCH ROUTE
Output #6: 2
Output #7: 3
Output #8: 9
Output #9: 9
Output #10: 7
```

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