Instructions:

1. ***Please attempt any 1 of the following 3 assignments. Do mention which one you've attempted***
2. *Feel free to use the internet for reference.*
3. *Please email back the code for the assignment within 2 days from now.*
4. *Your code should preferably be bundled as an Eclipse project.*
5. *Kindly mention the steps to execute your code if there are any typical settings to be done.*
   Note: *Coding language should be Java. Do focus on the quality of the code that you write. We would prefer the code to be Unit Tested if possible.*

Assignment 1: Mars Rover

A squad of robotic rovers are to be landed by NASA on a plateau on Mars.

This plateau, which is curiously rectangular, must be navigated by the rovers so that their on-board cameras can get a complete view of the surrounding terrain to send back to Earth.

A rover's position and location is represented by a combination of x and y co-ordinates and a letter representing one of the four cardinal compass points. The plateau is divided up into a grid to simplify navigation. An example position might be 0, 0, N, which means the rover is in the bottom left corner and facing North.

In order to control a rover, NASA sends a simple string of letters. The possible letters are 'L', 'R' and 'M'. 'L' and 'R' makes the rover spin 90 degrees left or right respectively, without moving from its current spot. 'M' means move forward one grid point, and maintain the same heading.

Assume that the square directly North from (x, y) is (x, y+1).

INPUT - The first line of input is the upper-right coordinates of the plateau. The lower-left coordinates are assumed to be 0,0.

The rest of the input is information pertaining to the rovers that have been deployed. Each rover has two lines of input. The first line gives the rover's position, and the second line is a series of instructions telling the rover how to explore the plateau.

The position is made up of two integers and a letter separated by spaces, corresponding to the x and y co-ordinates and the rover's orientation.

Each rover will be finished sequentially, which means that the second rover won't start to move until the first one has finished moving.

OUTPUT - The output for each rover should be its final co-ordinates and heading.

TEST INPUT AND OUTPUT

Test Input:

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

Expected Output:

```
1 3 N
5 1 E
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Assignment 2: Sales Tax

Basic sales tax is applicable at a rate of 10% on all goods, except books, food, and medical products that are exempt. Import duty is an additional sales tax applicable on all imported goods at a rate of 5%, with no exemptions.

When I purchase items I receive a receipt which lists the name of all the items and their price (including tax), finishing with the total cost of the items, and the total amounts of sales taxes paid. The rounding rules for sales tax are that for a tax rate of n%, a shelf price of p contains (np/100 rounded up to the nearest 0.05) amount of sales tax.

Write an application that prints out the receipt details for the following shopping baskets:

Basket 1:
Input:
1 book at 12.49
1 music CD at 14.99
1 chocolate bar at 0.85

Output:
1 book: 12.49
1 music CD: 16.49
1 chocolate bar: 0.85
Sales Taxes: 1.50
Total: 29.83

Basket 2:
Input:
1 imported box of chocolates at 10.00
1 imported bottle of perfume at 47.50

Output:
1 imported box of chocolates: 10.50
1 imported bottle of perfume: 54.65
Sales Taxes: 7.65
Total: 65.15

Basket 3:
Input:
1 imported bottle of perfume at 27.99
1 bottle of perfume at 18.99
1 packet of headache pills at 9.75
1 box of imported chocolates at 11.25

Output:
1 imported bottle of perfume: 32.19
1 bottle of perfume: 20.89
1 packet of headache pills: 9.75
1 imported box of chocolates: 11.85
Sales Taxes: 6.70
Total: 74.68

Assignment 3: The City of Archers

Back in human history there used to exist a city known as Genon City .It was always under threat from the enemies but it had the best archers in the world ever known to protect it.

To prepare for the battle, all archers performed similar actions. First go to 'wamboo' (a warehouse) to collect arrows. Number of arrows one gets is the sequence number in which he arrives, first one gets 1, second 2 and so on. No two archers arrive at the same time.

Every archer then puts the arrows inside marina (a machine) which first cleans the arrow, then sharpens and finally colour's it. But every 5th arrows that is cleaned gets broken, so the machine replaces it with a special arrow which is equivalent to 2 normal arrows and the archer is not aware of this.

At the battle fort, they stand in same sequence as they arrived at the warehouse and fire one by one starting with the first. Far away are enemies. It takes 2n arrows to kill an enemy, first 2, and second 4, third 6 and so on. Every 7th arrow fired misses the enemy which increases that enemy's strength and it requires 2 more arrows now to get killed. The archers is not aware of this.

Before every arrow is shot, an archer knows how many enemies are already killed or semi killed (shot with few arrows before). So he calculates arrows needed for killing the next enemy. An archer leaves whenever he doesn't have enough arrows to kill the enemy and next archers come to action.

A battle is won if all the enemies are killed with 0 or more arrows remaining.

Write an application which models the above situation. First input to the application should be the number of archers and the second input should be the number of enemies.

Test Input/Outputs

Scenario 1
Input

Number of Archers: 4
Number of Enemies: 2

Output

Battle – Won

Total Enemies Killed: 2
Total Arrows Fired: 6

Scenario 2
Input

Number of Archers: 20
Number of Enemies: 5

Output

Battle – Won

Total Enemies Killed: 5
Total Arrows Fired: 41

Scenario 3
Input

Number of Archers: 100
Number of Enemies: 50

Output

Battle – Lost

Total Enemies Killed: 45
Total Arrows Fired: 2817

Scenario 4
Input

Number of Archers: 70
Number of Enemies: 40

Output

Battle – Lost

Total Enemies Killed: 31
Total Arrows Fired: 1428

Good Luck!