

**CROATIAN OPEN COMPETITION IN
INFORMATICS**

7th ROUND

COCI 2009/2010

Task SPAVANAC

7th round, 24. April 2010.

1 second / 32 MB / 30 points

Every school morning Mirko is woken up by the sound of his alarm clock. Since he is a bit forgetful, quite often he leaves the alarm on on Saturday morning too. That's not too bad tough, since he feels good when he realizes he doesn't have to get up from his warm and cozy bed.

He likes that so much, that he would like to experience that on other days of the week too! His friend Slavko offered this simple solution: set his alarm clock 45 minutes early, and he can enjoy the comfort of his bed, fully awake, for 45 minutes each day.

Mirko decided to heed his advice, however his alarm clock uses 24-hour notation and he has issues with adjusting the time. Help Mirko and write a program that will take one time stamp, in 24-hour notation, and print out a new time stamp, 45 minutes earlier, also in 24-hour notation.

Note: if you are unfamiliar with 24-hour time notation yourself, you might be interested to know it starts with 0:00 (midnight) and ends with 23:59 (one minute before midnight).

INPUT

The first and only line of input will contain exactly two integers **H** and **M** ($0 \leq \mathbf{H} \leq 23$, $0 \leq \mathbf{M} \leq 59$) separated by a single space, the input time in 24-hour notation. **H** denotes hours and **M** minutes.

OUTPUT

The first and only line of output should contain exactly two integers, the time 45 minutes before input time.

SAMPLE TEST CASES

Input: 10 10	Input: 0 30	Input: 23 40
Output: 9 25	Output: 23 45	Output: 22 55

COCI 2009/2010**Task COKOLADA****7th round, 24. April 2010.**

1 second / 32 MB / 50 points

A new type of chocolate arrived in the local shop. The chocolate comes in bars, each bar consisting of **N** squares. Bars are factory made and only come in sizes which are full powers of two. In other words a single bar has 1, 2, 4, 8, 16, ... squares.

To fully asses the quality of chocolate Mirko must sample at least **K** squares. His friend Slavko would also like to try some of the chocolate. Since Mirko is in a hurry to try the chocolate himself, he decides to break the bar he bought in pieces, such that he has **exactly K** squares, and leaves the rest (if any) to Slavko. The bars are a bit brittle, so Mirko can break them only on their exact center. In other words, from one bar with **D** squares, he can get two bars with **D/2** squares.

Write a program that will determine the **minimal number of breaks** Mirko must perform in order to obtain exactly **K squares** (not necessarily in one piece). Also, determine the smallest bar size Mirko must buy in order to have at least **K** squares.

INPUT

The first and only line of input will contain one integer **K** ($1 \leq K \leq 1\,000\,000$), number of squares Mirko must sample.

OUTPUT

The first and only line of output should contain two integers, separated by a single space. The first integer is the smallest bar size Mirko must buy. The second the smallest number of breaks.

SAMPLE TEST CASES

Input: 6	Input: 7	Input: 5
Output: 8 2	Output: 8 3	Output: 8 3

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Task BAKICE

7th round, 24. April 2010.

1 second / 32 MB / 70 points

When it comes to trams, a lot of people are civilized individuals who know how to behave in one. However, there are always those few who upon spotting a place to sit will run towards it in supersonic speeds. If they spot more than one place, they always try the **closest one first**.

Problems arise when two or more such individuals aim for the same spot. If one of them is the **closest**, he or she will sit, and others won't even attempt to move in and instead turn their attention to the **next closest spot**. If however they are **all equally close**, they will all run to the seat resulting in a massive explosion that usually ends with complete **destruction of both them and the seat**.

You are given a description of one tram. It is represented as a table with **R** rows and **C** columns. The rude passengers are marked with the letter 'X'. Empty seats are marked with 'L' and the tram floor is marked with '.'. Note that although there are other passengers, the force projected by these idiots is more than enough to simply walk through them.

Distance between two cells is the Euclid distance between their centers. Write a program that will determine the number of explosions which will take place before all people are seated, or destroyed, or they run out of chairs.

INPUT

The first line of input contains two integers, **R** ($1 \leq R \leq 100$) and **C** ($1 \leq C \leq 100$), number of rows and columns.

The next **R** lines contain **C** characters each. '.', 'X' or 'L'.

There will always be at least one character 'X' and at least one 'L' in the input. **Also, there will be no two 'L' characters such that they are both equally distant to some 'X'**.

OUTPUT

The first and only line of input should contain the number of explosion for the given layout.

SAMPLE TEST CASES

Input: 4 4 .LX. .X..L..	Input: 4 4 .XLX .X.. ...L .X..	Input: 7 7 ...X.X. XL....LL...XLX...
Output: 1	Output: 2	Output: 1

COCI 2009/2010**Task SVEMIR****7th round, 24. April 2010.**

2 sekunde / 32 MB / 100 points

Fourth Great and Bountiful Human Empire is developing a transconduit tunnel network connecting all it's planets. The Empire consists of **N** planets, represented as points in the 3D space. The cost of forming a transconduit tunnel between planets A and B is:

$$TunnelCost[A,B] = \min\{ |x_A-x_B|, |y_A-y_B|, |z_A-z_B| \}$$

where (x_A, y_A, z_A) are 3D coordinates of planet A, and (x_B, y_B, z_B) are coordinates of planet B. The Empire needs to build exactly **N** - 1 tunnels in order to fully connect all planets, either by direct links or by chain of links. You need to come up with the lowest possible cost of successfully completing this project.

INPUT

The first line of input contains one integer **N** ($1 \leq N \leq 100\,000$), number of planets.

Next **N** lines contain exactly 3 integers each. All integers are between -10^9 and 10^9 inclusive. Each line contains the x, y, and z coordinate of one planet (in order).

No two planets will occupy the exact same point in space.

OUTPUT

The first and only line of output should contain the minimal cost of forming the network of tunnels.

SAMPLE TEST CASES

Input : 2	Input : 3 -1 -1 -1	Input : 5 11 -15 -15
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1 5 10 7 8 2	5 5 5 10 10 10	14 -5 -15 -1 -1 -5 10 -4 -1 19 -4 19
Output: 3	Output: 11	Output: 4

COCI 2009/2010**Task KRALJEVI****7th round, 24. April 2010.**

1 second / 64 MB / 120 points

Mirko and Slavko are playing a chess like game. The game is played on a non-standard chess board sized **R** rows by **C** columns. Each player starts with some number of chess kings. In chess kings can move from their current field to any of the 8 neighbouring fields.

Player spread is defined as the complete **sum of distances between all pairs** of pieces of the given player. The distance between two pieces is the smallest number of moves required for both pieces to reach the same field. No actual moves are performed when calculating the distance and as such enemy pieces do not influence the result.

Mirko knows that the spread is a vital piece of strategic information and would like you to make him a program that will calculate both his and Slavko's spread.

INPUT

The first line of input contains two integers **R** and **C** ($1 \leq R, C \leq 1\,000$), number of rows and columns.

Next **R** lines contain **C** characters each. Character '**M**' denotes Mirko's piece, '**S**' Slavko's piece and '.' denotes an empty field.

There is at least one piece per player on the board. Otherwise the game would be over.

OUTPUT

In the first and only line of output you need to print exactly two integers. The first integers is the spread of Mirko's and the second Slavko's pieces.

SCORING

In test cases worth **20%** of total points the number of pieces on the board will be less than or equal to 5000.

In test cases worth **60%** of total points, the numbers **R** and **C** will be smaller than or equal to 300.

SAMPLE TEST CASES

Input: 2 3 SMS MMS	Input: 2 3 S.M M..	Input: 4 5 M.... ..S.M SS..S .M...
Output: 3 5	Output: 2 0	Output: 10 13

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Task RESTORAN

7th round, 24. April 2010.

1 second / 128 MB / 130 points

In Croatia there are **N** cities connected by **E** twoway roads. Two large food chains have recently reached an agreement on market sharing. In the middle of each road, exactly one chain will be given rights to build a restaurant.

To ensure the market is shared fairly, each city must have at **least one restaurant from each chain** on the roads connected to that city. However, there are cities with only one road, or no roads at all, and for them it is impossible to have both chains. Such cities are doomed to visit one chain, or travel a bit further.

Write a program that will determine for each road the chain that should build there so that these requirements are met.

INPUT

The first line of input contains tow integers **N** and **E** ($1 \leq \mathbf{N}, \mathbf{E} \leq 100\ 000$), number of cities and number of roads.

The next **E** lines contain two integers each. Each line describes one road. Integers **A_i** and **B_i** ($1 \leq \mathbf{A}_i, \mathbf{B}_i \leq \mathbf{N}; \mathbf{A}_i \neq \mathbf{B}_i$) denote a road connecting cities **A_i** and **B_i**

There will never be two or more roads connecting the same cities.

OUTPUT

If there is no way to fairly assign the roads, the first and only line of input should contain "0".

Otherwise output exactly E lines, one for each road, in the same order as they were given in the input. The i^{th} line should contain "1" if the first chain has the right to build onthis road, or "2" if the second one does.

Note: if the solution is not unique, you may output any valid one.

SCORING

This task has test cases grouped into test runs. Each test run consists of one or more test cases. In order to score points for the test run, all test cases in the run must be solved correctly.

You **do not** need to worry about test runs during input and output. The system does that for you. Follow the format described in INPUT/OUTPUT to the letter!

Test runs worth **60%** have $N \leq 1000$, $E \leq 5000$.

SAMPLE TEST CASES

Input: 5 6 1 2 2 3 3 1 3 4 1 4 4 5	Input: 7 7 1 2 2 3 3 1 4 5 5 6 6 7 7 4	Input: 77777 4 1 2 1 3 1 4 1 5
Output: 1 2 1 2 2 1	Output: 0	Output: 1 2 2 2

