A. cAPS lOCK

time limit per test: 0.5 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

wHAT DO WE NEED cAPS LOCK FOR?

Caps lock is a computer keyboard key. Pressing it sets an input mode in which typed letters are capital by default. If it is pressed by accident, it leads to accidents like the one we had in the first passage.

Let's consider that a word has been typed with the Caps lock key accidentally switched on, if:

- either it only contains uppercase letters;
- or all letters except for the first one are uppercase.

In this case we should automatically change the case of all letters. For example, the case of the letters that form words "hELLO", "HTTP", "z" should be changed.

Write a program that applies the rule mentioned above. If the rule cannot be applied, the program should leave the word unchanged.

Input

The first line of the input data contains a word consisting of uppercase and lowercase Latin letters. The word's length is from 1 to 100 characters, inclusive.

Output

Print the result of the given word's processing.

Examples

input
```
cAPS
```
output
```
Caps
```

input
```
Lock
```
output
```
Lock
```

B. Opposites Attract

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Everybody knows that opposites attract. That is the key principle of the "Perfect Matching" dating agency. The "Perfect Matching" matchmakers have classified each registered customer by his interests and assigned to the i-th client number t_i ($-10 \le t_i \le 10$). Of course, one number can be assigned to any number of customers.

"Perfect Matching" wants to advertise its services and publish the number of opposite couples, that is, the couples who have opposite values of t. Each couple consists of exactly two clients. The customer can be included in a couple an arbitrary number of times. Help the agency and write the program that will find the sought number by the given sequence $t_1, t_2, \dots, t_n$. For example, if $t = (1, -1, 1, -1)$, then any two elements t_i and t_j form a couple if i and j have different parity. Consequently, in this case the sought number equals 4.

Of course, a client can't form a couple with him/herself.

Input

The first line of the input data contains an integer n ($1 \le n \le 10^5$) which represents the number of registered clients of the "Couple Matching". The second line contains a sequence of integers $t_1, t_2, \dots, t_n$ ($-10 \le t_i \le 10$), t_i — is the parameter of the i-th customer that has been assigned to the customer by the result of the analysis of his interests.

Output

Print the number of couples of customs with opposite t. The opposite number for x is number $-x$ (0 is opposite to itself). Couples that only differ in the clients' order are considered the same.

Note that the answer to the problem can be large enough, so you must use the 64-bit integer type for calculations. Please, do not use the %lld specificator to read or write 64-bit integers in C++. It is preferred to use cin, cout streams or the %I64d specificator.

Examples

input

```
5
-3 3 0 0 3
```

output

```
3
```

input

```
3
0 0 0
```

output

```
3
```

Note

In the first sample the couples of opposite clients are: **(1,2), (1,5) и (3,4)**.

In the second sample any couple of clients is opposite.

C. The World is a Theatre

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

There are n boys and m girls attending a theatre club. To set a play "The Big Bang Theory", they need to choose a group containing exactly t actors containing no less than 4 boys and no less than one girl. How many ways are there to choose a group? Of course, the variants that only differ in the composition of the troupe are considered different.

Perform all calculations in the 64-bit type: `long long` for C/C++, `int64` for Delphi and `long` for Java.

Input

The only line of the input data contains three integers n, m, t ($4 \le n \le 30, 1 \le m \le 30, 5 \le t \le n + m$).

Output

Find the required number of ways.

Please do not use the %lld specificator to read or write 64-bit integers in C++. It is preferred to use cin, cout streams or the %I64d specificator.

Examples

input

```
5 2 5
```

output

```
10
```

input

```
4 3 5
```

output

```
3
```

D. Subway

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

A subway scheme, classic for all Berland cities is represented by a set of n stations connected by n passages, each of which connects exactly two stations and does not pass through any others. Besides, in the classic scheme one can get from any station to any other one along the passages. The passages can be used to move in both directions. Between each pair of stations there is no more than one passage.

Berland mathematicians have recently proved a theorem that states that any classic scheme has a ringroad. There can be only one ringroad. In other words, in any classic scheme one can find the only scheme consisting of stations (where any two neighbouring ones are linked by a passage) and this cycle doesn't contain any station more than once.

This invention had a powerful social impact as now the stations could be compared according to their distance from the ringroad. For example, a citizen could say "I live in three passages from the ringroad" and another one could reply "you loser, I live in one passage from the ringroad". The Internet soon got filled with applications that promised to count the distance from the station to the ringroad (send a text message to a short number...).

The Berland government decided to put an end to these disturbances and start to control the situation. You are requested to write a program that can determine the remoteness from the ringroad for each station by the city subway scheme.

Input

The first line contains an integer n ($3 \le n \le 3000$), n is the number of stations (and trains at the same time) in the subway scheme. Then n lines contain descriptions of the trains, one per line. Each line contains a pair of integers x_i, y_i ($1 \le x_i, y_i \le n$) and represents the presence of a passage from station x_i to station y_i. The stations are numbered from 1 to n in an arbitrary order. It is guaranteed that $x_i \ne y_i$ and that no pair of stations contain more than one passage. The passages can be used to travel both ways. It is guaranteed that the given description represents a classic subway scheme.

Output

Print n numbers. Separate the numbers by spaces, the i-th one should be equal to the distance of the i-th station from the ringroad. For the ringroad stations print number `0`.

Examples

input

```
4
1 3
4 3
4 2
1 2
```

output

```
0 0 0 0
```

input

```
6
1 2
3 4
6 4
2 3
1 3
3 5
```

output

```
0 0 0 1 1 2
```

E. Yet Another Task with Queens

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

A queen is the strongest chess piece. In modern chess the queen can move any number of squares in any horizontal, vertical or diagonal direction (considering that there're no other pieces on its way). The queen combines the options given to the rook and the bishop.

There are m queens on a square $n \times n$ chessboard. You know each queen's positions, the i-th queen is positioned in the square (r_i, c_i), where r_i is the board row number (numbered from the top to the bottom from 1 to n), and c_i is the board's column number (numbered from the left to the right from 1 to n). No two queens share the same position.

For each queen one can count w — the number of other queens that the given queen threatens (attacks). For a fixed attack direction only the first queen in this direction is under attack if there are many queens are on the ray of the attack. Obviously, for any queen w is between 0 and 8, inclusive.

Print the sequence $t_0, t_1, \ldots, t_8$, where t_i is the number of queens that threaten exactly i other queens, i.e. the number of queens that their w equals i.

Input

The first line of the input contains a pair of integers n, m ($1 \le n, m \le 10^5$), where n is the size of the board and m is the number of queens on the board. Then m following lines contain positions of the queens, one per line. Each line contains a pair of integers r_i, c_i ($1 \le r_i, c_i \le n$) — the queen's position. No two queens stand on the same square.

Output

Print the required sequence $t_0, t_1, \ldots, t_8$, separating the numbers with spaces.

Examples

input

```
8 4
4 3
4 8
6 5
1 6
```

output

```
0 3 0 1 0 0 0 0 0
```

input

```
10 3
1 1
1 2
1 3
```

output

```
0 2 1 0 0 0 0 0 0
```

F. Present to Mom

time limit per test: 5 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

How many stars are there in the sky? A young programmer Polycarpus can't get this question out of his head! He took a photo of the starry sky using his digital camera and now he analyzes the resulting monochrome digital picture. The picture is represented by a rectangular matrix consisting of n lines each containing m characters. A character equals '1', if the corresponding photo pixel is white and '0', if it is black.

Polycarpus thinks that he has found a star on the photo if he finds a white pixel surrounded by four side-neighboring pixels that are also white:

```
 1
111
 1
```

a star on the photo

Polycarpus whats to cut out a rectangular area from the photo and give his mom as a present. This area should contain no less than k stars. The stars can intersect, have shared white pixels on the photo. The boy will cut out the rectangular area so that its borders will be parallel to the sides of the photo and the cuts will go straight between the pixel borders.

Now Polycarpus keeps wondering how many ways there are to cut an area out of the photo so that it met the conditions given above. Help Polycarpus find this number.

Input

The first line of the input data contains three integers n, m and k ($1 \le n, m \le 500; 1 \le k \le nm$). Then follow n lines, containing the description of the given photo as a sequence of lines. Each line contains m characters '0' or '1'.

Output

Print the required number of areas on the given photo.

Examples

input

```
4 6 2
111000
111100
011011
000111
```

output

```
6
```

input

```
5 5 4
11111
11111
11111
11111
11111
```

output

```
9
```

Note

We'll number the rows and columns below starting from 1, the coordinates (p, q) will denote a cell in row p, column q.

In the first sample Polycarpus should cut out any area containing a rectangle whose opposite corners lie in cells $(1, 1)$ and $(3, 4)$. Only rectangles with opposite corners in $(1, 1)$ and (x, y), where $x \ge 3$ and $y \ge 4$ fit the conditions.

In the second sample any rectangle whose each side is no less than four, will do. The possible rectangle sizes are 4×4, 4×5, 5×4 and 5×5. Such figures can be cut in 4 ways, 2 ways, 2 ways and 1 way correspondingly.

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