Croatian Open Competition in Informatics

Round 6, March 13th 2021

Tasks

Task	Time limit	Memory limit	Points
Bold	1 second	512 MiB	50
Alias	1 second	512 MiB	70
Anagramistica	1 second	512 MiB	110
Geometrija	1 second	512 MiB	110
Index	2.5 seconds	512 MiB	110
Total			450

Task Bold

In addition to the usual age-related health problems such as first signs of RSI [1] and physical injuries that accumulate faster than they heal, Daniel's eyesight has suddenly worsened.

Paula wrote him a letter, but he can't read it without glasses. She needs to **bold** the text, so Daniel can read it.

The letter can be represented as a matrix consisting of characters '.' and '#'. To bold it, Paula will replace each '#' in the original letter with a 2×2 square of '#' in the down-right direction.

Input

The first line contains integers n and m ($2 \le n, m \le 100$), the dimensions of the letter.

Each of the following n lines contains m characters '.' and '#' that represent Paula's letter.

The last row and column won't contain any '#'.

Output

Output n lines containing m characters '.' and '#', representing the bold letter.

Examples

input

```
4 4
....
.#..
....
....
```

output

```
....
.##.
.##.
....
```

input

```
7 7
.......
.####..
.#...#.
.#...#.
.#...#.
.####..
.......
```

output

```
.......
.#####.
.######
.##..##
.##..##
.######
.#####.
```

input

```
9 7
.......
.####..
.#...#.
.#...#.
.####..
.#.....
.#.....
.#.....
.......
```

output

```
.......
.#####.
.######
.##..##
.######
.#####.
.##....
.##....
.##....
```

[1] Repetitive strain injury. Never ignore the pain caused by typing. Ergonomic aids and chairs are generally always worth it. Sit straight. "A gram of prevention is worth a kilo of cure."

Task Alias

Novak and Rafael are playing a simplified version of the game Alias. Novak needs to make Rafael guess a word without saying it. Rafael has a database of n words in his head, and there are m connections between some words. The connection between words x and y, with time t, means that if Rafael remembers the word x or hears it, after t milliseconds he will remember the word y.

Novak and Rafael will play q rounds. In each round, Novak wants to know: if he says the word a, after how many milliseconds will Rafael remember the word b for the first time? The rounds are independent.

Input

The first line contains integers n ($2 \le n \le 1000$) and m ($1 \le m \le 1000$), the number of words and the number of connections.

Each of the following m lines contains two different words x_i and y_i, and an integer t_i ($1 \le t_i \le 10^9$), that describe a connection. The words consist of at most 20 lowercase letters. All words from Rafael's database will appear at least once. It is possible that there are multiple connections between some pairs of words.

The following line contains an integer q ($1 \le q \le 1000$), the number of rounds.

Each of the following q lines contains two different words a_i and b_i, the word that Novak will say and the word that Rafael needs to remember in the i-th round. Both words appear in Rafael's database.

Output

Output q lines. In the i-th line output the time for the i-th round in milliseconds, or `Roger` if Rafael will never remember the word.

Scoring

In test cases worth 20 points, it holds $1 \le n \le 10$.
In test cases worth additional 20 points, it holds $1 \le n \le 100$.

Examples

input

```
3 2
novak goat 1
goat simulator 3
2
novak simulator
simulator goat
```

output

```
4
Roger
```

input

```
3 3
kile legend 4
legend beer 5
beer kile 6
2
kile beer
legend kile
```

output

```
9
11
```

input

```
4 5
rafael me 5
me ow 6
ow ausopenfinal 2012
ausopenfinal me 2
rafael ausopenfinal 2
3
rafael me
me rafael
ow me
```

output

```
4
Roger
2014
```

Clarification of the first example:

In the first round, Novak will say the word `novak`. After 1 millisecond, Rafael will remember the word `goat`, and after 3 more milliseconds the required word `simulator`. In the second round, Novak will say the word `simulator`, but Rafael won't remember any other words.

Task Anagramistica

Biljana loves making crosswords. Her favourite type is the so called *anagram crossword*, where each clue is an anagram of the required solution.

She has a set of n words that she thinks would be good candidates for her next puzzle. We say that two words are *similar* if one can be obtained from the other by rearranging the letters (i.e. they are anagrams). She wants to select a subset of her words, such that there are **exactly k pairs of similar words** in that subset. Help Biljana determine the number of such subsets.

Input

The first line contains integers n ($1 \le n \le 2000$) and k ($0 \le k \le 2000$), the number of words and the required number of similar pairs.

Each of the following n lines contains a word consisting of at most 10 lowercase letters. All words will be distinct.

Output

Output the number of described subsets modulo $10^9 + 7$.

Scoring

Subtask	Points	Constraints
1	10	$1 \le n \le 15$
2	30	$0 \le k \le 3$
3	70	No additional constraints.

Examples

input

```
3 1
ovo
ono
voo
```

output

```
2
```

input

```
5 2
trava
vatra
vrata
leo
ole
```

output

```
3
```

input

```
6 3
mali
lima
imal
je
sve
ej
```

output

```
6
```

Clarification of the first example:

Subsets with exactly one similar pair are {`ovo`, `ono`, `voo`} and {`ovo`, `voo`}.

Task Geometrija

You are given n points on the plane, such that no three points lie on the same line.

We say that line segments $\overline{AB}$ and $\overline{CD}$ *cross* if they share a point X **different** from the points A, B, C and D.

Let $\mathcal{S}$ be the set of all line segments between pairs of the given points. Find the number of segments in $\mathcal{S}$ that don't cross with any other segment in $\mathcal{S}$.

Input

The first line contains an integer n ($3 \le n \le 1000$), the number of points.

The following n lines contain integers x_i and y_i ($-10^9 \le x_i, y_i \le 10^9$), the coordinates of the points.

Output

Output the requested number of segments.

Scoring

Subtask	Points	Constraints
1	20	$3 \le n \le 40$
2	30	$3 \le n \le 200$
3	60	No additional constraints.

Examples

input

```
4
1 1
-1 1
-1 -1
1 -1
```

output

```
4
```

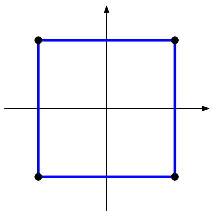
input

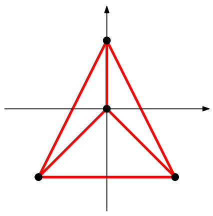
```
4
-1 -1
1 -1
0 1
0 0
```

output

```
6
```

Clarification of the examples:





Task Index

The *h-index* is an author-level metric that measures both the productivity and citation impact of the publications of a scientist or scholar. It is defined as the maximum value of h such that the given author has published h papers that have each been cited at least h times.

Our Mirko is nearing retirement. In his life he had published n papers and now q times he asks himself the following: "I wonder, what would be my h-index had I only published papers l_i through r_i?"

Help him calculate the answers.

Input

The first line contains integers n and q ($1 \le n, q \le 200\ 000$), the number of papers and the number of questions.

The second line contains n integers p_i ($1 \le p_i \le 200\ 000$), where p_i is the number of citations of the i-th paper.

The following q lines each contain two integers l_i and r_i ($1 \le l_i \le r_i \le n$), the endpoints from the i-th question.

Output

Output q lines. In the i-th line output the answer to the i-th question.

Scoring

Subtask	Points	Constraints
1	20	$1 \le n, q \le 1000$
2	40	$1 \le n, q \le 50\ 000$
3	50	No additional constraints.

Example

input

```
7 6
3 2 3 1 1 4 7
3 4
1 7
1 6
4 5
1 2
5 7
```

output

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