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Pasture Problem

Lower-left corner of the pasture is at the point (x_1, y_1), and the upper-right corner is at the point (x_2, y_2), where $x_2 > x_1$ and $y_2 > y_1$.

The second line of input has the same 4-integer format as the first line, and specifies the second original rectangular pasture.

This pasture will not overlap or touch the first pasture.

Output Format

(file square.out):

The output should consist of one line containing the minimum area required of a square pasture that would cover all the regions originally enclosed by the two rectangular pastures.

Sample Input

```
6 6 8 8
1 8 4 9
```

Sample Output:

```
49
```

In the example above, the first original rectangle has corners (6, 6) and (8, 8). The second has corners at (1, 8) and (4,9). By drawing a square fence of side length 7 with corners (1, 6) and (8, 13), the original areas can still be enclosed; moreover, this is the best possible, since it is impossible to enclose the original areas with a square of side length only 6. Note that there are several different possible valid placements for the square of side length 7, as it could have been shifted vertically a bit.

To Test: Input Data Set.

Possible Solution.

Hint: find smallest and largest

B0	B1	B2	S1	S2	G1	G2	P

BLOCK GAME

Farmer John is trying to teach his cows to read by giving them a set of N spelling boards typically used with preschoolers ($1 \le N \le 100$). Each board has a word and an image on each side. For example, one side might have the word 'cat' along with a picture of a cat, and the other side might have the word 'dog' along with a picture of a dog. When the boards are lying on the ground, N words are therefore shown. By flipping over some of the boards, a different set of N words can be exposed.

To help the cows with their spelling, Farmer John wants to fashion a number of wooden blocks, each embossed with a single letter of the alphabet. He wants to make sufficiently many blocks of each letter so that no matter which set of N words is exposed on the upward-facing boards, the cows will be able to spell all of these words using the blocks. For example, if $N=3$ and the words 'box', 'cat', and 'car' were facing upward, the cows would need at least one 'b' block, one 'o' block, one 'x' block, two 'c' blocks, two 'a' blocks, one 't' block, and one 'r' block.

Please help the Farmer John determine the minimum number of blocks for each letter of the alphabet that he needs to provide, so that irrespective of which face of each board is showing, the cows can spell all N visible words.

INPUT FORMAT

(file blocks.in):

Line 1 contains the integer N.

The next N lines each contain 2 words separated by a space, giving the two words on opposite sides of a board. Each word is a string of at most 10 lowercase letters.

OUTPUT FORMAT

(file blocks.out):

Please output 26 lines. The first output line should contain a number specifying the number of copies of 'a' blocks needed. The next line should specify the number of 'b' blocks needed, and so on.

SAMPLE INPUT:

```
3
fox box
dog cat
car bus
```

SAMPLE OUTPUT:

```
2
```

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

In this example, there are $N=3$ boards, giving $2^3=8$ possibilities for the set of upward-facing words:

```
fox dog car
fox dog bus
fox cat car
fox cat bus
box dog car
box dog bus
box cat car
box cat bus
```

We need enough blocks for each letter of the alphabet so that we can spell all three words, irrespective of which of these eight scenarios occurs.

To Test: Input Data Set.

Possible Solution

Hint: find letter frequency.

B0	B1	B2	S1	S2	G1	G2	P

THE COW-SIGNAL

Bessie and her cow friends are playing as their favorite cow superheroes. Of course, everyone knows that any self-respecting superhero needs a signal to call them to action.

Bessie has drawn a special signal on a sheet of $M \times N$ paper

($1 \leq M \leq 10$, $1 \leq N \leq 10$), but this is too small, much too small! Bessie wants to amplify the signal so it is exactly K times bigger ($1 \leq K \leq 10$) in each direction.

The signal will consist only of the '.' and 'X' characters.

INPUT FORMAT

(FILE COWSIGNAL.IN):
The first line of input contains M, N, and K, separated by spaces.

The next M lines each contain a length N string, collectively describing the picture of the signal.

OUTPUT FORMAT

(FILE COWSIGNAL.OUT):
You should output KM lines, each with KN characters, giving a picture of the enlarged signal.

SAMPLE INPUT :

```
5 4 2
XXX.
X..X
XXX.
X..X
XXX.
```

SAMPLE OUTPUT:

```
XXXXXX..
XXXXXX..
XX....XX
XX....XX
XXXXXX..
XXXXXX..
XX....XX
XX....XX
XXXXXX..
```

To Test: Input Data Set

Possible Solution

B0	B1	B2	S1	S2	G1	G2	P

COUNTING HAYES

($1 \leq N \leq 100,000$) at various points along the one-dimensional road running across his farm. To make sure they are spaced out appropriately, please help him answer Q queries ($1 \leq Q \leq 100{,}000$), each asking for the number of haybales within a specific interval along the road.

INPUT FORMAT

(file haybales.in):

The first line contains N and Q.

The next line contains N distinct integers, each in the range $0 \ldots 1{,}000{,}000{,}000$, indicating that there is a haybale at each of those locations.

Each of the next Q lines contains two integers A and B ($0 \leq A \leq B \leq 1{,}000{,}000{,}000$) giving a query for the number of haybales between A and B, inclusive.

OUTPUT FORMAT

(file haybales.out):

You should write Q lines of output. For each query, output the number of haybales in its respective interval.

SAMPLE INPUT:

```
4 6
3 2 7 5
2 3
2 4
2 5
2 7
4 6
8 10
```

SAMPLE OUTPUT:

```
2
2
3
4
1
0
```

To Test: Input Data Set

Possible Solution

B0	**B1**	B2	S1	S2	G1	G2	P

CITIES AND STATES

To keep his cows intellectually stimulated, Farmer John has placed a large map of the USA on the wall of his barn. Since the cows spend many hours in the barn staring at this map, they start to notice several curious patterns. For example, the cities of Flint, MI and Miami, FL share a very special relationship: the first two letters of "Flint" give the state code ("FL") for Miami, and the first two letters of "Miami" give the state code ("MI") for Flint.

Let us say that two cities are a "special pair" if they satisfy this property and come from different states. The cows are wondering how many special pairs of cities exist. Please help them solve this amusing geographical puzzle!

INPUT FORMAT

(file citystate.in):

The first line of input contains N (1≤N≤200,000), the number of cities on the map.

The next N lines each contain two strings: the name of a city (a string of at least 2 and at most 10 uppercase letters), and its two-letter state code (a string of 2 uppercase letters). Note that the state code may be something like ZQ, which is not an actual USA state. Multiple cities with the same name can exist, but they will be in different states.

OUTPUT FORMAT

(file citystate.out):

Please output the number of special pairs of cities.

SAMPLE INPUT:

```
6
MIAMI FL
DALLAS TX
FLINT MI
CLEMSON SC
BOSTON MA
ORLANDO FL
```

To Test: Input Data Set

Possible Solution

SAMPLE OUTPUT:

```
1
```

B0	B1	B2	S1	S2	G1	G2	P

MOOCAST

Farmer John's N cows ($1 \leq N \leq 200$) want to organize an emergency "moo-cast" system for broadcasting important messages among themselves.

Instead of mooing at each-other over long distances, the cows decide to equip themselves with walkie-talkies, one for each cow. These walkie-talkies each have a limited transmission radius -- a walkie-talkie of power P can only transmit to other cows up to a distance of P away (note that cow A might be able to transmit to cow B even if cow B cannot transmit back, due to cow A's power being larger than that of cow B). Fortunately, cows can relay messages to one-another along a path consisting of several hops, so it is not necessary for every cow to be able to transmit directly to every other cow.

Due to the asymmetrical nature of the walkie-talkie transmission, broadcasts from some cows may be more effective than from other cows in their ability to reach large numbers of recipients (taking relaying into account). Please help the cows determine the maximum number of cows that can be reached by a broadcast originating from a single cow.

INPUT FORMAT *(FILE MOOCAST.IN):*
The first line of input contains NN.

The next N lines each contain the x and y coordinates of a single cow (integers in the range $0\ldots25{,}000$) followed by p, the power of the walkie-talkie held by this cow.

OUTPUT FORMAT *(FILE MOOCAST.OUT):*
Write a single line of output containing the maximum number of cows a broadcast from a single cow can reach. The originating cow is included in this number.

SAMPLE INPUT:

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

SAMPLE OUTPUT*:*

```
3
```

In the example above, a broadcast from cow 1 can reach 3 total cows, including cow 1.

To Test: Input Data Set

Possible Solution

B0	B1	B2	S1	S2	G1	G2	P

USACO 2017 February Contest, Bronze

The Bronze division had 943 total participants, of whom 688 were pre-college students.

All competitors who scored 700 or higher on this contest are automatically promoted to the silver division -- to all who were promoted, congratulations! Detailed results for those promoted are here.

1

Why Did the Cow Cross the Road
View problem | Test data | Solution

2

Why Did the Cow Cross the Road II
View problem | Test data | Solution

3

Why Did the Cow Cross the Road III
View problem | Test data | Solution

USACO 2017 US Open Contest, Bronze

The Bronze division had 536 total participants, of whom 413 were pre-college students.

All competitors who scored 750 or higher on this contest are automatically promoted to the silver division -- to all who were promoted, congratulations! Detailed results for those promoted are here.

1

The Lost Cow
View problem | Test data | Solution

2

Bovine Genomics
View problem | Test data | Solution

3

Modern Art
View problem | Test data | Solution