A. The Goal

Limits: 1 sec., 256 MiB

You favorite football team just scored a goal. All the players (except of the goalkeeper) would like to get together and hug each other. We consider players to be points on the plain. All the players move with the same speed that is one unit of distance per one unit of time. You have to find minimal possible time they need to get together.

Input

You are given 10 lines. Each line contains two integers X_j and Y_j separated with a single space. Here (X_j, Y_j) are coordinates of the j-th player.

Output

The minimal time required with absolute or relative error not exceeding 10^{-4}.

Constraints

$-1000 \leq X_j, Y_j \leq 1000$.

Samples

Input (*stdin*)	Output (*stdout*)
-6 7 5 4 5 4 8 7 8 -7 5 4 8 -1 -4 3 -6 -7 1 -9	9.8995

B. The Food

Limits: 1 sec., 256 MiB

There are N plates with food. Each plate is described by its food name and its weight. You want to take some of them, but you don't want to have two plates with the same food (i.e. with the same food name). Find the maximal possible total weight of the food you can take.

Input

The first line contains the integer N. Each of the following N lines contains a string S_j and an integer W_j separated with a single space. Here S_j is the name of the food on the j-th plate and W_j is the weight of the j-th plate.

Output

The only integer which is the maximal possible total food weight.

Constraints

$1 \le N < 1000$,
$1 \le W_j \le 1000$,
$1 \le |S_j| \le 10$,
S_j contains only lowercase Latin letters.

Samples

Input (*stdin*)	Output (*stdout*)
7 potato 4 soup 2 potato 9 steak 2 steak 5 potato 4 rice 1	17

Notes

You can take plates `potato 9`, `soup 2`, `steak 5` and `rice 1`.

C. The Colored Map

Limits: 1 sec., 256 MiB

There are N cities (numbered from 1 to N) and M roads on the map of Ukraine. You want to paint each city in either blue or yellow color. If there is a road between two cities they need to be painted in the same color.

After you pain all the cities you calculate the number X which is the number of yellow cities on the map. Find the number of different possible values of X you can get.

Input

The first line contains two integers N and M separated with a single space. Each of the following M lines contains two integers A_j and B_j separated with a single space. It means the j-th road connects cities A_j and B_j.

Output

The only integer which is the number of different values of X you can get.

Constraints

$1 \leq N, M \leq 100000(10^5)$,
$1 \leq A_j, B_j \leq N$,
$A_j \neq B_j$.

Samples

Input (*stdin*)	Output (*stdout*)
7 7 1 4 4 7 2 5 2 6 5 3 4 1 6 5	4

Notes

The cities 1, 4 and 7 should be painted in the same color. Similarly, the cities 2, 3, 5 and 6 should have the same color. Thus, the number X can have four different values: 0, 3, 4 or 7.

D. The Balanced Numbers

Limits: 1 sec., 256 MiB

A positive integer number is called balanced if the number of digits 4 is equal to the number of digits 7 in its decimal representation. For example, numbers 47, 14007 and 5 are balanced, and numbers 44, 575 and 1111747 are not.

You have to find the number of balanced integers between A and B, inclusive.

Input

Two integers A and B separated with a single space.

Output

The only integer which is the number of balanced numbers.

Constraints

$1 \leq A \leq B \leq 1000000000000000000 (10^{18})$.

Samples

Input (*stdin*)	Output (*stdout*)
`44 74`	`18`

Notes

The interval $[44, 74]$ contains the following balanced numbers: 47, 50, 51, 52, 53, 55, 56, 58, 59, 60, 61, 62, 63, 65, 66, 68, 69 and 74.

E. The Simple Problem

Limits: 2 sec., 256 MiB

You have two positive integers X and Y and you want to find X to the power of Y (i.e. X^Y). Find the number of different results you can get if X is at most A and Y is at most B.

Input

Two integers A and B separated with a single space.

Output

The only integer which is the number of different results you can get.

Constraints

$1 \leq A, B \leq 1000000000(10^9)$.

Samples

Input (*stdin*)	Output (*stdout*)
7 4	23

Notes

The results you can get for the sample input:
$1 = 1^1 = 1^2 = 1^3 = 1^4 = 1^5 = 1^6 = 1^7$,
$2 = 2^1, 3 = 3^1, 4 = 2^2 = 4^1, 5 = 5^1, 6 = 6^1, 7 = 7^1$,
$8 = 2^3, 9 = 3^2, 16 = 2^4 = 4^2, 25 = 5^2, 36 = 6^2, 49 = 7^2$,
$64 = 4^3, 81 = 3^4, 125 = 5^3, 216 = 6^3, 256 = 4^4, 343 = 7^3$,
$625 = 5^4, 1296 = 6^4$ and $2401 = 7^4$.

F. The Regional Contest

Limits: 1 sec., 256 MiB

At the regional contest Ukraine is represented by the only one team. Except of Ukraine there are teams from N other countries. Each team gains some score which is a nonnegative integer number. A team advances to the finals if there are at most seven other teams with higher score.

For each country you don't know the number of its teams, but you know the sum of their scores. You have to find the minimal possible score Ukrainian team has to gain to be sure that they advance to the finals.

Input

The first line contains the integer number N. Each of the following N lines contains one integer S_j which is the sum of scores of the teams from the j-th country.

Output

The only integer number which is the minimal score Ukrainian team has to gain.

Constraints

$1 \leq N \leq 100$,
$1 \leq S_j \leq 1000000000(10^9)$.

Samples

Input (*stdin*)	Output (*stdout*)
4 30 5 15 22	7

Notes

There can be at most six teams with score at least 8. On the other hand there can be nine teams with score 7, thus Ukraine may not advance to the final with score 6.

G. The Palindrome

Limits: 1 sec., 256 MiB

You are given ten strings $S_1, S_2, ..., S_{10}$. You have to find a string T with the following properties:

- T is a palindrome, i.e. the reversed T is equal to T;
- T contains each of the given strings S_1, S_2, ..., S_{10} as a substring;
- T is as short as possible.

You have to find the string T. If there are several possible such strings, choose lexicographically the smallest one. One string is lexicographically smaller then another (which has the same length) if it contains smaller character at the first position they differ. The characters are ordered from `a` to `z`.

Input

You are given ten lines. Each line contains the string S_j.

Output

The only line containing the string T.

Constraints

$1 \leq |S_j| \leq 10$,
S_j consists of only lowercase Latin letters.

Samples

Input (*stdin*)	Output (*stdout*)

`team`
`mama`
`a`
`ama`
`mama`
`ea`
`et`
`tea`
`ae`
`team`
	`teamamaet`

H. The Strings Problem

Limits: 2 sec., 256 MiB

You are given an array A of N strings, consisting of lowercase English letters. Let's number the elements of the array from 1 to N, then let's denote the element number i as A_i. For each string A_i $(1 \le i \le n)$ you want to find the number of pairs of integers l and r $(1 \le l \le r \le |A_i|)$ such that the substring $A_i[l \dots r]$ is a substring to at least K strings from array A (including the i-th string).

Input

The first line contains two space-separated integers — N and K. Next N lines contain array A. The i-th line contains a non-empty string A_i, consisting of lowercase English letter.

Output

On a single line print N space-separated integers — the i-th number is the answer for string A_i.

Constraints

$1 \le N, K \le 10^5$,
The total length of all strings A_i does not exceed 10^5.

Samples

Input (*stdin*)	Output (*stdout*)
3 1 abc a ab	6 1 3
7 4 rubik furik abab baba aaabbbababa abababababa zero	1 0 9 9 21 30 0