A - Next Alphabet

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 100 points

Problem Statement

Given is a lowercase English letter C that is not `'z'`. Print the letter that follows C in alphabetical order.

Constraints

- C is a lowercase English letter that is not `'z'`.

Input

Input is given from Standard Input in the following format:

```
C
```

Output

Print the letter that follows C in alphabetical order.

Sample Input 1

```
a
```

Sample Output 1

```
b
```

`'a'` is followed by `'b'`.

Sample Input 2

```
y
```

Sample Output 2

```
z
```

`'y'` is followed by `'z'`.

B - Achieve the Goal

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 200 points

Problem Statement

Takahashi is taking exams on N subjects. The score on each subject will be an integer between 0 and K (inclusive).

He has already taken exams on $N-1$ subjects and scored A_i points on the i-th subject.

His goal is to achieve the average score of M points or above on the N subjects.

Print the minimum number of points Takahashi needs on the final subject to achieve his goal.

If the goal is unachievable, print `'-1'` instead.

Constraints

- $2 \leq N \leq 100$
- $1 \leq K \leq 100$
- $1 \leq M \leq K$
- $0 \leq A_i \leq K$
- All values in input are integers.

Input

Input is given from Standard Input in the following format:

N K M
A_1 A_2 $\ldots$ A_{N-1}

Output

Print the minimum number of points required on the final subject, or `'-1'`.

Sample Input 1

```
5 10 7
8 10 3 6
```

Sample Output 1

```
8
```

If he scores 8 points on the final subject, his average score will be $(8+10+3+6+8)/5 = 7$ points, which meets the goal.

Sample Input 2

```
4 100 60
100 100 100
```

Sample Output 2

```
0
```

Scoring 0 points on the final subject still meets the goal.

Sample Input 3

```
4 100 60
0 0 0
```

Sample Output 3

```
-1
```

He can no longer meet the goal.

C - Welcome to AtCoder

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 300 points

Problem Statement

Takahashi participated in a contest on AtCoder.

The contest had N problems.

Takahashi made M submissions during the contest.

The i-th submission was made for the p_i-th problem and received the verdict S_i (`'AC'` or `'WA'`).

The number of Takahashi's correct answers is the number of problems on which he received an `'AC'` once or more.

The number of Takahashi's penalties is the sum of the following count for the problems on which he received an `'AC'` once or more: the number of `'WA'`s received before receiving an `'AC'` for the first time on that problem.

Find the numbers of Takahashi's correct answers and penalties.

Constraints

- N, M, and p_i are integers.
- $1 \leq N \leq 10^5$
- $0 \leq M \leq 10^5$
- $1 \leq p_i \leq N$
- S_i is `'AC'` or `'WA'`.

Input

Input is given from Standard Input in the following format:

N M
p_1 S_1
:
p_M S_M

Output

Print the number of Takahashi's correct answers and the number of Takahashi's penalties.

Sample Input 1

```
2 5
1 WA
1 AC
2 WA
2 AC
2 WA
```

Sample Output 1

```
2 2
```

In his second submission, he received an `'AC'` on the first problem for the first time. Before this, he received one `'WA'` on this problem.

In his fourth submission, he received an `'AC'` on the second problem for the first time. Before this, he received one `'WA'` on this problem.

Thus, he has two correct answers and two penalties.

Sample Input 2

```
100000 3
7777 AC
7777 AC
7777 AC
```

Sample Output 2

```
1 0
```

Note that it is pointless to get an `'AC'` more than once on the same problem.

Sample Input 3

```
6 0
```

Sample Output 3

```
0 0
```

D - Maze Master

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 400 points

Problem Statement

Takahashi has a maze, which is a grid of $H \times W$ squares with H horizontal rows and W vertical columns.

The square at the i-th row from the top and the j-th column is a "wall" square if S_{ij} is `'#'`, and a "road" square if S_{ij} is `'.'`.

From a road square, you can move to a horizontally or vertically adjacent road square.

You cannot move out of the maze, move to a wall square, or move diagonally.

Takahashi will choose a starting square and a goal square, which can be any road squares, and give the maze to Aoki.

Aoki will then travel from the starting square to the goal square, in the minimum number of moves required.

In this situation, find the maximum possible number of moves Aoki has to make.

Constraints

- $1 \leq H, W \leq 20$
- S_{ij} is `'.'` or `'#'`.
- S contains at least two occurrences of `'.'`.
- Any road square can be reached from any road square in zero or more moves.

Input

Input is given from Standard Input in the following format:

H W
$S_{11}...S_{1W}$
:
$S_{H1}...S_{HW}$

Output

Print the maximum possible number of moves Aoki has to make.

Sample Input 1

```
3 3
...
...
...
```

Sample Output 1

```
4
```

If Takahashi chooses the top-left square as the starting square and the bottom-right square as the goal square, Aoki has to make four moves.

Sample Input 2

```
3 5
...#.
.#.#.
.#...
```

Sample Output 2

```
10
```

If Takahashi chooses the bottom-left square as the starting square and the top-right square as the goal square, Aoki has to make ten moves.

E - Max-Min Sums

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 500 points

Problem Statement

For a finite set of integers X, let $f(X) = \max X - \min X$.

Given are N integers $A_1, \ldots, A_N$.

We will choose K of them and let S be the set of the integers chosen. If we distinguish elements with different indices even when their values are the same, there are ${}_N C_K$ ways to make this choice. Find the sum of $f(S)$ over all those ways.

Since the answer can be enormous, print it $\mod (10^9 + 7)$.

Constraints

- $1 \leq N \leq 10^5$
- $1 \leq K \leq N$
- $|A_i| \leq 10^9$

Input

Input is given from Standard Input in the following format:

```
N K
A_1 ... A_N
```

Output

Print the answer $\mod (10^9+7)$.

Sample Input 1

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

Sample Output 1

```
11
```

There are six ways to choose S: $\{1,1\}, \{1,3\}, \{1,4\}, \{1,3\}, \{1,4\}, \{3,4\}$ (we distinguish the two 1s). The value of $f(S)$ for these choices are $0, 2, 3, 2, 3, 1$, respectively, for the total of 11.

Sample Input 2

```
6 3
10 10 10 -10 -10 -10
```

Sample Output 2

```
360
```

There are 20 ways to choose S. In 18 of them, $f(S) = 20$, and in 2 of them, $f(S) = 0$.

Sample Input 3

```
3 1
1 1 1
```

Sample Output 3

```
0
```

Sample Input 4

```
10 6
1000000000 1000000000 1000000000 1000000000 1000000000 0 0 0 0 0
```

Sample Output 4

```
999998537
```

Print the sum $\mod (10^9+7)$.

F - Enclose All

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 600 points

Problem Statement

Given are N points (x_i, y_i) in a two-dimensional plane.

Find the minimum radius of a circle such that all the points are inside or on it.

Constraints

- $2 \leq N \leq 50$
- $0 \leq x_i \leq 1000$
- $0 \leq y_i \leq 1000$
- The given N points are all different.
- The values in input are all integers.

Input

Input is given from Standard Input in the following format:

N
x_1 y_1
:
x_N y_N

Output

Print the minimum radius of a circle such that all the N points are inside or on it.

Your output will be considered correct if the absolute or relative error from our answer is at most 10^{-6}.

Sample Input 1

```
2
0 0
1 0
```

Sample Output 1

```
0.500000000000000000
```

Both points are contained in the circle centered at $(0.5, 0)$ with a radius of 0.5.

Sample Input 2

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

Sample Output 2

```
0.707106781186497524
```

Sample Input 3

```
10
10 9
5 9
2 0
0 0
2 7
3 3
2 5
10 0
3 7
1 9
```

Sample Output 3

```
6.726812023536805158
```

If the absolute or relative error from our answer is at most 10^{-6}, the output will be considered correct.