Bop-It
UAC1 2014

Bop-It is a game that consists of following a series of commands issued through speakers. Each time the speakers will say either "Bop it!" (B), "Twist it!" (T) or "Pull it!" (P) and then the player must perform the corresponding action. The goal is to be able to correctly perform the maximum number of actions in a row.
John is a very skilled player of Bop-It. After work, John and his fiends like to place bets on how much commands John will be able to perform before failing. John's friend Alice observed that whenever he has to execute a sequence of three distinct commands, his concentration decreases.
Alice does not like to loose money so she decided to hack the toy and found out what will be the sequence of commands the toy will ask. Assuming that John only makes a mistake if he has to execute more than k times in a row three distinct commands, help Alice to find out what should be the number she bets on.

Given the sequence of commands the toy will issue and k, find out what will be the first command that John will fail to execute.

Input

The input consists of two lines. The first contains a string s over the alphabet $\{B, T, P\}$ representing the commands the toy will request. The second line contains the integer k described above.

Constraints

Let $|s|$ denote the length of s.

- $3 \leq |s| \leq 10^5$

- $0 \leq k \leq |s| - 3$

Output

The output consists of a single line. If John will be able to complete the sequence of moves without failing, output `No bet`. Otherwise print the number of the first move John will fail (moves are numbered starting at 1).

Sample Test Cases

Sample Input 1

```
BTPB
1
```

Sample Output 1

```
4
```

Sample Input 2

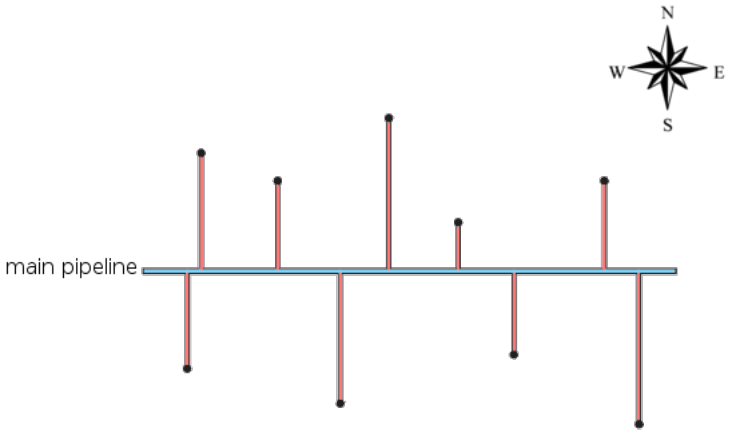
```
BTPBTBTP
3
```

Sample Output 2

```
No bet
```

Pipeline
UAC1 2014

An oil driling company wants to build a main pipeline running from West to East. The company has n wells that have to be connected to the main pipeline. Each well will be connected by an auxiliary pipeline that will be built along the shortest path between the well and the main pipeline as shown in the picture.



The main pipeline is represented by the horizontal blue line. The wells correspond to the dots and the auxiliary pipelines are the red segments linking the wells to the main pipeline. We wish to minimize the sum of the length of the red segments.

Given the positions of the n wells, determine the position of the main pipeline that minimizes the sum of the lengths of the auxiliary pipelines.

Input

The first line contains an integer n giving the number of wells. Then follow n lines each with two integers separated by a single space, x_i and y_i, giving the position of the i-th well.

Constraints

- $1 \leq n \leq 10^5$

- $-10^8 \leq x_i, y_i \leq 10^8$

Output

A single line with an integer corresponding to the location (y coordinate) of the best position of the main pipeline. If there are several possible solutions output the smallest one (the one that is the most to the South).

Sample Test Cases

Sample Input 1

```
2
0 -5
0 5
```

Sample Output 1

```
-5
```

Sample Input 2

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

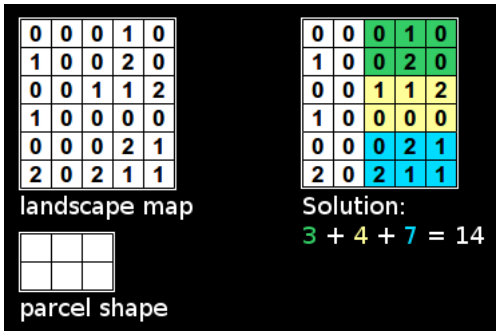
Sample Output 2

```
1
```

Buying Land
UAC1 2014

The UAC (Union of Architects of the Countryside) wants to buy three equal sized parcels of land. They already sent a team to analyze the landscape and they came back with a map giving the value of each location.
The map is a rectangular grid of locations and a parcel of land is set of locations that form a sub-rectangle of the grid.
Now it is up to you to find the three parcels of land that the UAC should buy in order to maximize the total value of the land. The three parcels cannot not intersect but can be adjacent.

Example (corresponds to sample input 2):



Given the map of the countryside and the size of parcels, compute the maximum value that can be achieved by buying three **non-intersecting** parcels of land of the given size.

Input

The first line of the input contains two integers n and m representing the number of rows and columns of the map, respectively.
Then follow n lines each with m integers such that the j-th integer of the i-th line, v_{ij}, represents the value of location (i, j).
Finally there is a line with two integers h and w representing the height and the width of the parcels of land that should be bought.

Constraints

- $1 \leq n, m \leq 500$

- $1 \leq h \leq n/2$
- $1 \leq w \leq m/2$
- $1 \leq v_{ij} \leq 1000$

Output

A single line with the maximum total value that can be achieved.

Sample Test Cases

Sample Input 1

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

Sample Output 1

```
8
```

Sample Input 2

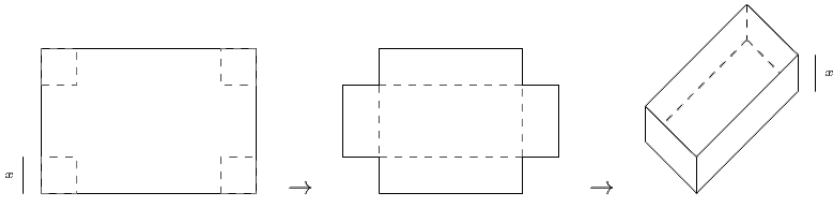
```
6 5
0 0 0 1 0
1 0 0 2 0
0 0 1 1 2
1 0 0 0 0
0 0 0 2 1
2 0 2 1 1
2 3
```

Sample Output 2

```
14
```

Making a Box
UAC1 2014

Given a a by b sheet of paper we can build a box by cutting an x by x square on each corner, with $0 < x < \min(a/2, b/2)$, and then folding and gluing the edges as in the figure.



Given an integer volume V, find out the minimum area A such that there exists a sheet of paper with integer length sides of area A from which it is possible to build a box of volume V.

Note that x needs not to be an integer.

Input

The input consists of a single line with one integer V.

Constraints

- $1 \leq V \leq 50000$

Output

A single line with the minimum area.

Sample Test Cases

Sample Input 1

20

Sample Output 1

42

Sample Input 2

37

Sample Output 2

64

Pickup and Delivery
UAC1 2014

A futuristic pickup and delivery company is considering the use of translocators in their buisness. A translocator is a device that allows the user to teleport himself. It has the two following functions:

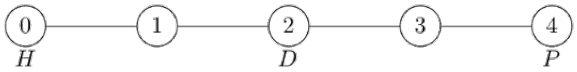
- Destroy the current portal if one exists and create one at you current location.
- Teleport yourselft to the portal. The portal is destroyed.

Note that this means that there can only be one portal at a given time. Both these actions are instantaneous and take no time to execute.

Given a map, the location of the company headquarters H, the pickup location P and the delivery location D, they would like to know what is the minimum time it takes to go from H to P and then to D knowing that you have a translocator available.
Note that you can use the translocator any number of times.

Example:

Suppose the map is given by the following graph.



Input

The input starts with a line with two integers n and m separated by a single space. The first one represents the number of locations and the second one the number of connections between them.

Then follow m lines each with two integers u_i and u_j separated by a single space, indicating that there is a bidirectional road between locations u_i and u_j. You may assume that you will never be given the same road twice and that there exists at most one road between any two locations.

All roads have the same length.

Finally there is one last line with three itegers H, P and D giving the headquarters location, the pickup location and the delivery location, respectivey.

Constraints

- $1 \leq n \leq 50000$
- $0 \leq m \leq (n^2 - n)/2$
- $0 \leq H, P, D < n$
- $S \neq H, S \neq D, P \neq D$
- $0 \leq u_i < n$
- The graph is connected.

Output

A single line with the minimum travel time.

Sample Test Cases

Sample Input 1

```
5 4
0 1
1 2
2 3
3 4
0 2 4
```

Sample Output 1

```
4
```

Sample Input 2

```
5 6
0 1
1 2
2 3
2 4
0 3
0 4
0 4 3
```

Sample Output 2

```
2
```