

Mattox's Game II (Hard Version)

Time Limit: 3 Second
Memory Limit: 256 MB

If you have seen the normal version of this problem before, the differences between the two versions are the range of numbers and the shape of the nodes.

After realizing his newly invented game was a failure (because he cannot win the game at all!), Mattox decided to create a new game to prove his talent in game design. To help him test this game, Mattox asks you to play with him, offering you more free points in the competitive programming class if you can win the game.

At the beginning of the game, you are provided with a ring of number nodes, where two adjacent number nodes are connected by an edge with an operator on it. In each turn, you can select an edge from the ring and merge the numbers on the two ends of the edge according to the operator. More formally, if the operator on the edge is \oplus and the numbers are a and b , $a \leftrightarrow b$ will be replaced by $a \oplus b$. The game terminates when there is only one number in the ring. The free points Mattox gives to you is equal to the remaining number (of course it is possible to lose points!).

You want to know the maximum number you can get before the game to decide if you should play it. Write a program to find out the maximum number if you adopt the best strategy.

Input

The first line of input contains a single integer n ($1 \leq n \leq 100$) - the number of nodes in the ring.

The second line contains n integers a_1, \dots, a_n ($|a_i| \leq 1000$) - the numbers on each node.

The last line contains n operators o_1, \dots, o_n ($o_i \in \{+, *\}$) - the operator on the edge connecting nodes with numbers a_i and $a_{(i \bmod n)+1}$

Output

Output a single integer denoting the maximum number you can get if you adopt the best strategy.

Sample Inputs

```
5
3 -2 1 5 -4
+ + * + *
```

Sample Outputs

```
8
```

Note

The following is one possible set of moves:

1. Choose the second and third numbers, getting 3 -1 5 -4.
2. Choose the second and third numbers, getting 3 -5 -4.
3. Choose the first and second numbers, getting -2 -4.
4. Choose the first and second numbers, getting 8.