A - Blackjack

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 100 points

Problem Statement

Given are three integers A_1, A_2, and A_3.

If $A_1 + A_2 + A_3$ is greater than or equal to 22, print `bust`; otherwise, print `win`.

Constraints

- $1 \leq A_i \leq 13 \ \ (i = 1, 2, 3)$
- All values in input are integers.

Input

Input is given from Standard Input in the following format:

$$A_1 \quad A_2 \quad A_3$$

Output

If $A_1 + A_2 + A_3$ is greater than or equal to 22, print `bust`; otherwise, print `win`.

Sample Input 1

```
5 7 9
```

Sample Output 1

```
win
```

$5 + 7 + 9 = 21$, so print `win`.

Sample Input 2

```
13 7 2
```

Sample Output 2

```
bust
```

$13 + 7 + 2 = 22$, so print `'bust'`.

B - Palindrome-philia

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 200 points

Problem Statement

Takahashi loves palindromes. Non-palindromic strings are unacceptable to him. Each time he hugs a string, he can change one of its characters to any character of his choice.

Given is a string S. Find the minimum number of hugs needed to make S palindromic.

Constraints

- S is a string consisting of lowercase English letters.
- The length of S is between 1 and 100 (inclusive).

Input

Input is given from Standard Input in the following format:

$$S$$

Output

Print the minimum number of hugs needed to make S palindromic.

Sample Input 1

```
redcoder
```

Sample Output 1

```
1
```

For example, we can change the fourth character to `'o'` and get a palindrome `'redooder'`.

Sample Input 2

```
vvvvvv
```

Sample Output 2

```
0
```

We might need no hugs at all.

Sample Input 3

```
abcdabc
```

Sample Output 3

```
2
```

C - HonestOrUnkind2

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 300 points

Problem Statement

There are N people numbered 1 to N. Each of them is either an *honest* person whose testimonies are always correct or an *unkind* person whose testimonies may be correct or not.

Person i gives A_i testimonies. The j-th testimony by Person i is represented by two integers x_{ij} and y_{ij}. If $y_{ij} = 1$, the testimony says Person x_{ij} is honest; if $y_{ij} = 0$, it says Person x_{ij} is unkind.

How many honest persons can be among those N people at most?

Constraints

- All values in input are integers.
- $1 \leq N \leq 15$
- $0 \leq A_i \leq N - 1$
- $1 \leq x_{ij} \leq N$
- $x_{ij} \neq i$
- $x_{ij_1} \neq x_{ij_2} (j_1 \neq j_2)$
- $y_{ij} = 0, 1$

Input

Input is given from Standard Input in the following format:

$$
\begin{array}{l}
N \\
A_1 \\
x_{11} \quad y_{11} \\
x_{12} \quad y_{12} \\
\vdots \\
x_{1A_1} \quad y_{1A_1} \\
A_2 \\
x_{21} \quad y_{21} \\
x_{22} \quad y_{22} \\
\vdots \\
x_{2A_2} \quad y_{2A_2} \\
\vdots \\
A_N \\
x_{N1} \quad y_{N1} \\
x_{N2} \quad y_{N2} \\
\vdots \\
x_{NA_N} \quad y_{NA_N}
\end{array}
$$

Output

Print the maximum possible number of honest persons among the N people.

Sample Input 1

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

Sample Output 1

```
2
```

If Person 1 and Person 2 are honest and Person 3 is unkind, we have two honest persons without inconsistencies, which is the maximum possible number of honest persons.

Sample Input 2

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

Sample Output 2

```
0
```

Assuming that one or more of them are honest immediately leads to a contradiction.

Sample Input 3

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

Sample Output 3

```
1
```

D - Xor Sum 4

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 400 points

Problem Statement

We have N integers. The i-th integer is A_i.

Find $\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}(A_i \text{ XOR } A_j)$, modulo (10^9+7).

▶ What is XOR ?

Constraints

- $2 \leq N \leq 3 \times 10^5$
- $0 \leq A_i < 2^{60}$
- All values in input are integers.

Input

Input is given from Standard Input in the following format:

$$N$$
$$A_1 \quad A_2 \quad \ldots \quad A_N$$

Output

Print the value $\sum_{i=1}^{N-1} \sum_{j=i+1}^{N} (A_i \text{ XOR } A_j)$, modulo $(10^9 + 7)$.

Sample Input 1

```
3
1 2 3
```

Sample Output 1

```
6
```

We have $(1 \text{ XOR } 2) + (1 \text{ XOR } 3) + (2 \text{ XOR } 3) = 3 + 2 + 1 = 6$.

Sample Input 2

```
10
3 1 4 1 5 9 2 6 5 3
```

Sample Output 2

```
237
```

Sample Input 3

```
10
3 14 159 2653 58979 323846 2643383 27950288 419716939 9375105820
```

Sample Output 3

```
103715602
```

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

E - Balanced Path

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 500 points

Problem Statement

We have a grid with H horizontal rows and W vertical columns. Let (i, j) denote the square at the i-th row from the top and the j-th column from the left.

The square (i, j) has two numbers A_{ij} and B_{ij} written on it.

First, for each square, Takahashi paints one of the written numbers red and the other blue.

Then, he travels from the square $(1, 1)$ to the square (H, W). In one move, he can move from a square (i, j) to the square $(i + 1, j)$ or the square $(i, j + 1)$. He must not leave the grid.

Let the *unbalancedness* be the absolute difference of the sum of red numbers and the sum of blue numbers written on the squares along Takahashi's path, including the squares $(1, 1)$ and (H, W).

Takahashi wants to make the unbalancedness as small as possible by appropriately painting the grid and traveling on it.

Find the minimum unbalancedness possible.

Constraints

- $2 \leq H \leq 80$
- $2 \leq W \leq 80$
- $0 \leq A_{ij} \leq 80$
- $0 \leq B_{ij} \leq 80$
- All values in input are integers.

Input

Input is given from Standard Input in the following format:

$$
\begin{array}{l}
H \quad W \\
A_{11} \quad A_{12} \quad \ldots \quad A_{1W} \\
: \\
A_{H1} \quad A_{H2} \quad \ldots \quad A_{HW} \\
B_{11} \quad B_{12} \quad \ldots \quad B_{1W} \\
: \\
B_{H1} \quad B_{H2} \quad \ldots \quad B_{HW}
\end{array}
$$

Output

Print the minimum unbalancedness possible.

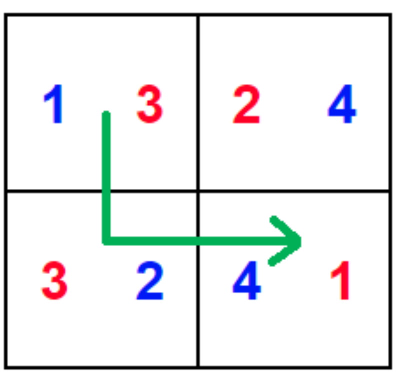
Sample Input 1

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

Sample Output 1

```
0
```

By painting the grid and traveling on it as shown in the figure below, the sum of red numbers and the sum of blue numbers are $3+3+1=7$ and $1+2+4=7$, respectively, for the unbalancedness of 0.



Sample Input 2

```
2 3
1 10 80
80 10 1
1 2 3
4 5 6
```

Sample Output 2

```
2
```

F - Sum Difference

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 600 points

Problem Statement

We have an integer sequence A of length N, where $A_1 = X, A_{i+1} = A_i + D (1 \leq i < N)$ holds.

Takahashi will take some (possibly all or none) of the elements in this sequence, and Aoki will take all of the others.

Let S and T be the sum of the numbers taken by Takahashi and Aoki, respectively. How many possible values of $S - T$ are there?

Constraints

- $-10^8 \leq X, D \leq 10^8$
- $1 \leq N \leq 2 \times 10^5$
- All values in input are integers.

Input

Input is given from Standard Input in the following format:

$$N \quad X \quad D$$

Output

Print the number of possible values of $S - T$.

Sample Input 1

```
3 4 2
```

Sample Output 1

```
8
```

A is $(4, 6, 8)$.

There are eight ways for (Takahashi, Aoki) to take the elements: $((), (4, 6, 8))$, $((4), (6, 8))$, $((6), (4, 8))$, $((8), (4, 6))$, $((4, 6), (8))$, $((4, 8), (6))$, $((6, 8), (4))$, and $((4, 6, 8), ())$.

The values of $S - T$ in these ways are -18, -10, -6, -2, 2, 6, 10, and 18, respectively, so there are eight possible values of $S - T$.

Sample Input 2

```
2 3 -3
```

Sample Output 2

```
2
```

A is $(3, 0)$. There are two possible values of $S - T$: -3 and 3.

Sample Input 3

```
100 14 20
```

Sample Output 3

```
49805
```