

Problem 1 - Tower of Hanoi (Programming) (10 points)

Problem Description

Tower of Hanoi is a classic mathematical game, which consists of three vertical pegs and several disks of different sizes. Robert, an extraordinarily handsome guy, is good at playing Tower of Hanoi optimally.

Once, he played the games repeatedly for a few days and nights until he was too tired and suddenly fell into sleep. After he woke up, he forgot what he had done for the current game. Moreover, he might even make some wrong moves.

You, a big fan of Robert, are eager to help him. Given the total number of disks and the game's current state, please tell him whether he is on the right way. That is, there is an optimal solution containing the current state. Also, if he is on the right way, please tell him the minimum number of remaining steps to finish the game. Since the number of remaining steps might be extremely large, you should tell him the number modulo 998,244,353.

Input

The first line of the input contains an integer n , indicating the number of disks in his current game. The disks are numbered from 1 to n (from small to big). Also, the pegs are numbered from 1 to 3 (from left to right).

The following three lines contain $(k_i + 1)$ space-separated integers: the first integer k_i of the i^{th} line indicates the number of disks on the i^{th} peg, and the following k_i integers are the disks' numbers from **bottom to top** on this peg.

- $1 \leq n = \sum_{i=1}^3 k_i \leq 100000$
- The input is guaranteed to be a valid state of the game.

Test Group 0 (0 %)

- Sample Input

Test Group 3 (20 %)

- The current state is on the right way.

Test Group 1 (20 %)

- $n \leq 10$

Test Group 4 (30 %)

- No other constraints.

Test Group 2 (30 %)

- $n \leq 50$

Output

If he had moved correctly, output an integer indicating the minimum number of remaining steps to finish the game modulo 998,244,353. Otherwise, output “-1” (without quotes).

Sample Input 1

3
1 3
2 2 1
0

Sample Input 2

3
1 3
0
2 2 1

Sample Input 2

5
1 3
1 2
3 5 4 1

Sample Output 1

4

Sample Output 2

-1

Sample Output 2

5