THE ACM-ICPC 2021
HAUI PROGRAMMING CONTEST
Host: INFORMATION TECHNOLOGY FACULTY, HAUI
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Contest length: 3 hours

The problem set consists of 6 problems in 8 pages (excluding the cover page):

- Problem A: **CHITUANH with Triangles**
- Problem B: **CHITUANH with Exclusive-OR Sequence**
- Problem C: **CHITUANH with Ants**
- Problem D: **CHITUANH with The award**
- Problem E: **CHITUANH with String**
- Problem F: **CHITUANH with Math contest**

Problem A: CHITUANH with Triangles

Input: standard input
Output: standard output
Time limit per test: 1.0 second
Memory limit per test: 128 megabyte

There are n wooden sticks, the i-th stick is d_i cm long. With 3 sticks, we may form a triangle. Your task is to count the number of ways to form triangles.

Input

- The first input line contains positive integer n ($n \leq 2500$)
- The second line contains n positive integer $d_1, d_2, \ldots, d_n$ ($d_i \leq 10^9$).

Output

- Output 1 numbers: the number of triangles.

Sample

INPUT	OUTPUT
3 1 2 3	0
4 1 1 1 1	4
3 3 4 5	1

Problem B: CHITUANH with Exclusive-OR Sequence

Input: standard input
Output: standard output
Time limit per test: 1.0 second
Memory limit per test: 128 megabyte

AAA has a nonnegative integer sequence $a_1, a_2, \ldots, a_n$ with m constraints, each of which is described as $a_u \oplus a_v = w$, where $\oplus$ denotes the bitwise exclusive-OR operation.

More precisely, the bitwise exclusive-OR operation is a binary operation which is equivalent to applying logical exclusive-OR to every pair of bits located on the same positions in binary notation of operands. In other words, a binary digit of the result is equal to 1 if and only if bits on the respective positions in the operands are different. For example, if $X = 109_{10} = 1101101_2$ and $Y = 41_{10} = 101001_2$, then $X \oplus Y = 1000100_2 = 68_{10}$.

Now AAA wants to find out the minimum sum of all the elements in the sequence, or determine that the sequence meets all the constraints that do not exist.

Input

- The first line contains two integers n ($1 \leq n \leq 10^5$) and m ($0 \leq m \leq 2.10^5$), denoting the length of sequence and the number of conditions.
- The follow m lines, each of which contains three integers u, v ($1 \leq u, v \leq n$) and w ($0 \leq w \leq 2^{30}$), indicating a constraint that $a_u \oplus a_v = w$.

Output

- Output a line containing a single integer, indicating the minimum sum of all the elements in the sequence or −1 if the sequence meets all the constraints does not exist

Sample

INPUT	OUTPUT
3 2 1 2 1 2 3 1	1

3 3 1 2 1 2 3 1 1 3 1	-1

Note

- In the first sample case, the sequence $[a_1, a_2, a_3] = [0, 1, 0]$ meets all the constraints and has the minimum sum of all the elements.

Problem C: CHITUANH with Ants

Input: standard input
Output: standard output
Time limit per test: 1.0 second
Memory limit per test: 128 megabyte

It has been noted that if some ants are put in the junctions of the graphene integer lattice then they will act in the following fashion: every minute at each junction (x, y) containing at least four ants then a group will be formed. From the group, each four ants will scatter to the neighbouring junctions (x + 1, y), (x - 1, y), (x, y + 1), (x, y - 1) — one ant in each direction. No other ant movements will happen. Ants never interfere with each other.

Scientists have put a colony of n ants into the junction (0, 0) and now they wish to know how many ants will there be at some given junctions, when the movement of the ants stops.

Input

- First input line contains integers n $(0 \le n \le 30000)$ and t $(1 \le t \le 50000)$, where n is the number of ants in the colony and t is the number of queries. Each of the next t lines contains coordinates of a query junction: integers x_i, y_j $(-10^9 \le x_i, y_i \le 10^9)$. Queries may coincide.
- It is guaranteed that there will be a certain moment of time when no possible movements can happen (in other words, the process will eventually end).

Output

- Print t integers, one per line — the number of ants at the corresponding junctions when the movement of the ants stops.

Sample

INPUT	OUTPUT
1 3 0 1 0 0 0 -1	0 1 0

6 5	0
0 -2	1
0 -1	2
0 0	1
0 1	0
0 2	

Note

- In the first sample the colony consists of one ant, so nothing happens at all.
- In the second sample the colony consists of 6 ants. At the first minute 4 ants scatter from (0, 0) to the neighbouring junctions. After that the process stops.

Problem D: CHITUANH with The award

Input: standard input
Output: standard output
Time limit per test: 1.0 second
Memory limit per test: 128 megabyte

The city of Hanoi has organized a tournament with a lot of food as an award for the winner. Of course, CHITUANH quickly participates. The award includes n kinds of food with $w_1, w_2, w_3, \ldots, w_n$ $(0 < w_i \leq 10^9)$ as their weights. With the spirit of eating, CHITUANH is definitely the champion and takes the award. However, the game does not end, after touching the food with weight v, suddenly all other food with weight v disappears, and finally the rest is for the winner. CHITUANH wants to bring as much food as possible to his house, but as his stomach is growling, his brain stops working. You guys, please help this poor rabbit.

Input

- The first input line contains positive integer n $(n \leq 10^5)$.
- The second line contains weights of food for winner $w_1, w_2, \ldots, w_n$.

Output

- Print exactly one integer - the most amount of food that CHITUANH can bring to his house.

Sample

INPUT	OUTPUT
5 1 6 2 1 1	9

Problem E: CHITUANH with String

Input: standard input
Output: standard output
Time limit per test: 1.0 second
Memory limit per test: 128 megabyte

A substring is a contiguous sequence of characters in a string. For example, "a", "bcd", "e" are substrings of "abcde" but "ace" isn't.

You are given 2 binary strings A and B (binary string only consists of '0' and '1'). Your task is to find a binary string C with smallest length such that C is not a substring of A and C is not a substring of B. If there are multiple strings with the smallest length, find one with the smallest lexicographical order.

String $X = x_1 x_2 \ldots x_n$ is lexicographically smaller than string $Y = y_1 y_2 \ldots y_n$ if $x_i < y_i$ for the first i where x_i and y_i differ. In this problem, character '0' is considered less than character '1'.

Input

- The first line of input contains binary string A.
- The second line of input contains binary string B. Both are not empty and their length does not exceed 1000.

Output

- Output string C in one line.

Sample

INPUT	OUTPUT
0001 110	010

Problem F: CHITUANH with Math contest

Input: standard input
Output: standard output
Time limit per test: 1.0 second
Memory limit per test: 128 megabyte

CHITUANH takes part in a math contest. He is given n tasks, each consists of k subtasks, numbered 1 through k. It takes him t_j minutes to solve the j-th subtask of any task. Thus, time required to solve a subtask depends only on its index, but not on the task itself. CHITUANH can solve subtasks in any order.

By solving subtasks of arbitrary problems he earns one point. Thus, the number of points for a task is equal to the number of solved subtasks in it. Moreover, if CHITUANH completely solves the task (solves all k of its subtasks), he receives one extra point. Thus, total number of points he receives for the complete solution of the task is k + 1.

CHITUANH has M minutes of time. What is the maximum number of points he can earn?

Input

- The first line contains three integer numbers n, k and M ($1 \le n \le 45$, $1 \le k \le 45$, $0 \le M \le 2 \cdot 10^9$).
- The second line contains k integer numbers, values t_j ($1 \le t_j \le 1000000$), where t_j is the time in minutes required to solve the j-th subtask of any task.

Output

- Print the maximum amount of points CHITUANH can earn in M minutes.

Sample

INPUT	OUTPUT
3 4 11 1 2 3 4	6
5 5 10 1 2 4 8 16	7