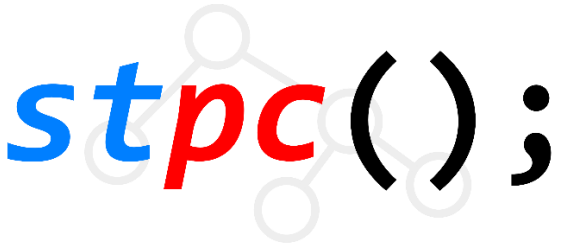

Buddhist Sin Tak College Competitive Programming Team Mini Team Competition (I)

Task Overview

ID	Name	Time Limit	Memory Limit
A	Alice's Astounding Alchemy	1.000 s	256 MB
B	Binary Sequence	0.500 s	256 MB
C	Convolutional Neural Network	1.000 s	256 MB
D	Decode IV	1.000 s	256 MB
E	Escape Byteland	1.000 s	256 MB
F	Flip Phone	1.000 s	256 MB
G	Gathering	1.000 s	256 MB
H	House Meeting	1.000 s	256 MB
I	Ice Cream	1.000 s	256 MB
J	Just Buy Some Stocks	1.000 s	256 MB

Notice:

Either **C++** or **Python** are allowed to be used in this examination. However, it is not guaranteed that a full solution can be achieved using Python.

C++ programmers should be aware that using C++ streams (`cin` / `cout`) may lead to I/O bottlenecks and substantially lower performance.

For some problems 64-bit integers may be required. In C++ it is `long long` and its token for `scanf` or `prinf` is `%lld`.

A Alice's Astounding Alchemy

Time Limit: 1.000 s Memory Limit: 256 MB

Alice is a talented alchemist. Recently, she created N ($1 \le N \le 1000$) potions numbered from 1 to N. Each potion has its *astounding value* A_i ($0 \le A_i \le 10^5$). However, a potion itself is not astounding enough! Therefore, Alice decides to mix two potions. The mixture of two potions will be *perfect* if the sum of the astounding value of two potions is a square number. (If x is a square number, then there exist a non-negative integer k such that $k \times k = x$).

Alice wants to know that how many pairs of potion (i, j) where $i < j$ such that their mixture is perfect. Could you help her?

INPUT

Input two lines.

The first line contains an integer N.

The second line contains N integers, where the i-th integer contains the astounding value A_i of potion i.

OUTPUT

Output the number of pairs of potion where their mixture is perfect.

SAMPLES

	Input	Output
1	5 1 4 3 3 5	3

B Binary Sequence

Time Limit: 0.500 s Memory Limit: 256 MB

Binary search is a common trick in competitive programming. To search for a given integer x in a sorted sequence, the following algorithm can be used:

```
L ← the beginning element of the sequence
R ← the last element of the sequence
while L <= R do
    M ← quotient of (L + R) / 2
    if x = M then
        break
    else if x < M then
        R ← M - 1
    else
        L ← M + 1
```

Now, you are given a sequence from 1 to N ($1 \le N \le 10^7$). Then, you perform the algorithm above for each integer from 1 to N on the given sequence. After that, Bob wants to know the number of times the variable M in the algorithm is equal to an integer k ($1 \le k \le N$) during all executions of the algorithm. As Bob is very curious about this, he will ask you Q ($1 \le Q \le 100$) times.

INPUT

Input $Q + 1$ lines.

The first line contains two integers N and Q.

For the next Q lines, each line contains an integer k.

OUTPUT

Output Q lines. For each given k, output the desired result.

SAMPLES

	Input	Output
1	8 2 3 6	1 4

C Convolutional Neuron Network

Time Limit: 1.000 s Memory Limit: 256 MB

Dr. Jones is an Artificial Intelligence engineer in Binary Stream Tensor Corporation (BSTC). He is currently developing a deep learning network based on convolutional neural network (CNN). As his assistant, you need to help him simulate a fundamental operation in CNN, called the convolutional operation.

You are given an image P with height H ($1 \le H \le 100$) and width W ($1 \le W \le 100$). Additionally, you are given a square-shaped kernel Q with side K ($1 \le K \le \min(H, W)$). After convolutional operation, a convolved feature map C will be generated with the height $H - K + 1$ and width $W - K + 1$. Assume the index of the image, kernel and the convolved feature map are 0-based. Then, C can be calculated as follows:

$$C[x][y] = \min\left(255, \sum_{i=0}^{K-1}\sum_{j=0}^{K-1}\left(P[x+i][y+j] \times Q[i][j]\right)\right)$$

All elements in P and Q are non-negative integers not exceeding 255. You are required to write a program to calculate the convolved feature map. Otherwise, you will be fired!

INPUT

Input $H + K + 1$ lines.

The first line contains three integers, H, W and K.

For the next H lines, the i-th line contains W integers, representing the i-th row of elements in P.

For the next K lines, the i-th line contains K integers, representing the i-th row of elements in Q.

OUTPUT

Output the content of C. Two elements must be separated by a whitespace.

SAMPLES

	Input	Output
1	5 5 3 12 15 21 0 0 0 10 10 10 0 0 0 10 10 10 0 0 10 10 0 0 10 10 0 0 1 0 1 0 1 0 1 0 1	53 35 51 20 40 30 20 30 40

D Decode IV

Time Limit: 1.000 s Memory Limit: 256 MB

The undercover in Bitland sent a secret message to Byteland again. However, Bitland notices the action of the undercover sending message to Byteland! To counterattack, Bitland interfered with the message sent from Bitland to Byteland by scrambling the message. Therefore, it is of paramount importance for Byteland to validate the message received.

A message is *valid* if all conditions below are satisfied:

1. The message contains only digits (0 to 9);
2. The product of any two consecutive digits must be even.

This time, the message received consists of N ($2 \le N \le 20$) digits. As a government official, you wants to know the number of valid permutation of the message so Byteland can reassemble the message. Could you solve this task?

INPUT

Input two lines.

The first line contains an integer N.

The second line contains a string with length N, which is the message received by Byteland.

OUTPUT

Output the number of valid permutation of the message received.

SAMPLES

	Input	Output
1	5 12345	12
2	6 908070	80
3	7 1235679	0

E Escape Byteland

Time Limit: 1.000 s Memory Limit: 256 MB

Unfortunately, you have stucked in Byteland. Byteland has N towns numbered from 1 to N ($2 \le N \le 50$), and M ($1 \le M \le \min\left(1000, \frac{N(N+1)}{2}\right)$) bidirection roads. It is guaranteed that there is at most one road connecting between any two towns. You are initially in town 1 and the exit of Byteland is in town N.

Here's the catch! The emperor of Byteland does not want you to leave the city easily. Therefore, you are equipped with an electronic bracelet with a smart bomb installed. In Byteland, a road can be categorized as a *normal road* or a *hidden road*. With the bomb installed, you can pass through normal roads only. Luckily, you can remove the bomb at any towns. However, you can only pass through hidden roads once you removed the bomb and you can never pass through any normal roads.

Nevertheless, you have a limited amount of stamina. For each time you passing through a road or removing a bomb cost one stamina. You want to escape Byteland as soon as possible. Find out the minimum stamina required to reach the exit of Byteland whenever possible.

INPUT

The first line contains two integers, N and M.

For the next M lines, each line contains two integers x, y and k, representing a bidirection road connecting zone x and y. If k is 1, the road is a *normal road*. If k is 0, the road is a *hidden road*.

OUTPUT

If you can safely escape Byteland, output `Possible` in the first line and the minimum stamina required in the second line.

Otherwise, output `Impossible`.

SAMPLES

	Input	Output
1	4 5 1 2 1 1 3 0 2 3 1 2 4 0 3 4 1	Possible 3

You can pass through a normal road from town 1 to town 2. Then, you remove the bomb at town 2. After that, you pass through a hidden road from town 2 to town 4. 3 stamina is required.

F Flip Phone

Time Limit: 1.000 s Memory Limit: 256 MB

Have you ever used a flip phone before? The panel of a flip phone is as follows:

1	2 abc	3 def
4 ghi	5 jkl	6 mno
7 pqrs	8 tuv	9 wxyz
*	0	#

You need to enter an English character by pressing the number key multiple times. For example, you need to press the character `x` by pressing button 9 twice, while you need to press the character `y` by pressing button 9 three times. To enter the word "`tab`", you need to press buttom 8 once, button 2 once and button 2 twice.

Given a string *s* consists of lowercase letters only with length not exceeding 100, find the number of times you press the button on the panel of the flip phone.

INPUT

Input the string *s*.

OUTPUT

Output the number of times you press the button on the panel of the flip phone.

SAMPLES

	Input	Output
1	`helloworld`	`24`
2	`buddhistsintakcollege`	`46`

G Gathering

Time Limit: 1.000 s Memory Limit: 256 MB

Dr. Jones is a robot scientist. His laboratory is formed by a $N \times M$ $(1 \le N, M \le 10^7)$ grid, with the coordinate of top left corner be (1,1) and the bottom right corner be (N, M). Initially, the laboratory is empty. He is currently investigating "gathering spot", where the sum of the Manhattan distance of each robot to the gathering spot is the least. Your goal, as the assistant of Dr. Jones, is to find a suitable gathering spot given the position of all robots. The Manhattan distance between two coordinates (x_1, y_1) and (x_2, y_2) is defined as $|x_1 - x_2| + |y_1 - y_2|$.

To benefit the research, Dr. Jones may ask you to perform Q $(1 \le Q \le 10^5)$ several operations:

1. Add a robot at a position which is not occupied by another robot.
2. Find a valid gathering spot with coordinates in real numbers. It is guaranteed that there exists at least one robot when this operation is called. If there exists multiple valid gathering spots, output any of them.

All operations above are guaranteed to be valid. There exists at least one operation 2. Please implement the operations.

INPUT

Input Q + 1 lines.

The first line contains three integers, N, M and Q.

Each of the next Q lines contains an operation:

- `1 x y`: Add a robot at the position (x, y)
- `2`: Output a valid gathering spot

OUTPUT

For each operation 2, output two integers in each line, which is the coordinate of a valid gathering spot.

SAMPLES

	Input	Output
1	4 4 6 1 1 1 1 2 1 1 3 2 2 1 4 2 2	2 1 2.5 2.5

H House Meeting

Time Limit: 1.000 s Memory Limit: 256 MB

Byteland is hosting an annual house meeting. There are N ($1 \le N \le 10^6$) participants numbered from 1 to N. Initially, they are seated with a given order. However, Dr. Jones, want them to be seated in another desired order. Dr. Jones can ask any two participants to swap their seats. At least how many swapping is needed for all participants to be seated in the order desired by Dr. Jones?

INPUT

Input three lines.

The first line contains an integer N.

The second line contains N integers, which is the initial seating order of all participants.

The third line contains N integers, which is the desired order of Dr. Jones.

OUTPUT

Output an intger, which is the minimum number of swapping needed for all participants to be seated in the order desired by Dr. Jones.

SAMPLES

	Input	Output
1	7 1 2 3 4 5 6 7 3 2 5 1 4 7 6	4

I Ice Cream

Time Limit: 1.000 s Memory Limit: 256 MB

It is very hot during summer time. Therefore, you decide to eat some ice cream. To encourage more customers to buy ice cream, the shop owner promotes an activity in the shop: you can use three ice cream sticks to exchange for a free ice cream! (Each ice cream will have one ice cream stick, obviously.)

For example, if you buy 5 ice cream, you will have 5 ice cream sticks. You can use 3 of them to exchange for a free ice cream. After eating the free ice cream, 3 ice cream sticks remain and you can exchange for another free ice cream.

As it is extremely hot today, you want to eat N ($1 \le N \le 10^8$) ice cream. At least how many ice cream you need to buy initially?

INPUT

Input an integer N.

OUTPUT

Output an integer, which is the minimum number of ice cream you need to buy initially.

SAMPLES

	Input	Output
1	7	5
2	20	14

J

Just Buy Some Stocks

Time Limit: 1.000 s Memory Limit: 256 MB

As a genius, Bob loves buying some stocks and receiving profits from them. This time, Bob has N ($1 \le N \le 10^7$) dollars and zero savings initially as his capital and there are M ($1 \le M \le 10^4$) stocks for sale. Also, $N \times M \le 10^7$. The i-th stock has a cost c_i ($1 \le c_i \le 10^4$) and a profit p_i ($1 \le p_i \le 10^4$). For each day, his strategy is as follow:

1. He must use his capital to buy one stock and add the profit of the stock to the *cumulative profit* of Bob.
2. After buying the stock, Bob's savings will add up by the amount recorded in his cumulative profit.
3. If Bob cannot buy any stock at that day, record his savings as the final savings.

Note that each stock can be bought at most once. Bob wants to know the maximum savings he could get. Could you help him?

INPUT

Input three lines.

The first line contains two integers, N and M.

The second line contains M integers. The i-th integer indicates c_i, the cost of the i-th stock.

The third line contains M integers. The i-th integer indicates p_i, the profit of the i-th stock.

OUTPUT

Output the maximum savings Bob could get.

SAMPLES

	Input	Output
1	10 5 1 2 3 4 5 1 2 3 4 5	30
2	100 7 30 50 20 10 60 10 10 5 10 15 16 34 15 15	229