L. Zayin and Raffle

Zayin is playing an interesting computer game Battlegrounds, which is developed by Tendollars Company. In this game, there are m weapons that players can use, such as AK-47 Assault rifle, shotgun, Rocket Propelled Grenade and so on. Those m weapons are numbered from 1 to m.

Players can start a match. In a match, up to one hundred players equipped with weapons parachute onto an island and fight with each other. The last player to survive will win the game.

For the same weapon, the player can be equipped with at most one. So we can learn the strength of a player from the set of weapons he owns.

Firstly, I want to show you how to represent a set of weapons using binary number. We can use an m-bit binary number x to denote a set S. The i-th bit (from least significant to most significant) of x represents whether S contains the i-th weapon. When the i-th bit is 1, the set contains the i-th weapon. Otherwise, the set does not contain it. We call the number x is the **numberic representation** of the set S. For simplicity, we just use the decimal form of x to describe a set S in the rest of this problem description.

For example, when $x = 6$, its binary form is 110, which means weapons 2 and 3 are in the set.

In the beginning, Zayin doesn't have any weapons (the set of his weapons can be denoted as 0). So he is very easy to be defeated by other players. Zayin needs to collect more weapons to become stronger.

He is going to participate in an n-round raffle. In each round, Tendollars Company will show k boxes, each of which contains some types of weapons. Zayin will get **exactly one box** in this round and obtain all weapons in this box. The probability that Zayin gets the j-th box is $p_j (1 \le j \le k)$. Because programmers in the company wrote some bad codes, these probabilities $p_j (1 \le j \le k)$ wouldn't change among rounds. The set of weapons in the j-th box in i-th round is a_{ij}.

Let $f(x)$ be the probability that the final set of weapons Zayin obtains is x.

For all possible sets $x (0 \le x \le 2^m - 1)$, please calculate the value of $f(x)$, modulus 1000000007.

Input

The first line contains three integers, $n, m, k (1 \le n \le 100000, 1 \le m \le 16, 1 \le k \le 8)$, the number of rounds of raffle, the number of different weapons, the number of boxes in each round.

The second line contains k intergers, $b_1, b_2, ..., b_k (0 \le b_j \le 1000000000)$. The probability that Zayin gets j-th box in a round is $p_j = \frac{b_j}{1000000000}$. It is guaranteed that the sum of all b_j is 1000000000.

Following n lines describe weapon sets in each box in each round. The i-th line contains k integers, $a_{i1}, a_{i2}, ..., a_{ik}$. a_{ij} is the numberic representation of set of weapons in the j-th box of i-th round.

Output

Output 2^m lines, the x-th line contains the value of $f(x-1)$ (modulus 1000000007), $x = 1, 2, \ldots, 2^m$

Sample

Input	Output
2 2 2 400000000 600000000 1 0 2 1	0 200000002 680000005 120000001

Hint

In the sample above, the probabilities to get the two boxes are $\frac{2}{5}$ and $\frac{3}{5}$ respectively.

The probablities of sets after each round are shown in the following table.

set of weapons	00	01	10	11
Initial	1	0	0	0
After 1st round	$\frac{3}{5}$	$\frac{2}{5}$	0	0
After 2nd round	0	$\frac{3}{5}$	$\frac{6}{25}$	$\frac{4}{25}$