Programming Challenge - Coin Multiplication

In Toomville, people trade using a peculiar system of currency. In this system, there are infinitely many different types of coins. Each coin has a *label* and a *value*. For every (not necessarily positive) integer, there exists a coin of that label: that is, there are coins labeled 0, coins labeled 27, coins labeled -5, etc. The value of each coin is a (not necessarily positive) real number.

You're a merchant in Toomville who needs to perform certain transactions using these coins. Unfortunately, you forgot what the values of each of the coins are! If someone gave you a coin labeled -5, for example, you wouldn't remember how much it's worth. You do remember one thing from your training, though: for every integer x, the combined value of the two coins with labels x and $x + 1$ is equivalent to the value of a coin with label $x + 2$. Perhaps this piece of information is still enough to accomplish the tasks that you need to do…

Your supervisor has given you a positive integer k for you to write down, which can be up to 4000 digits long. He then assigns you to serve up to 10 customers. Each customer will first tell you how many coins they have, then the labels of each of their coins—it is guaranteed that each of their coins will have distinct labels between -10000 and 10000 inclusive. If a customer's coins added up have a total value of v, your task is to provide them with a list of coins, with distinct labels, whose total value is kv (in particular, you will tell them the labels of these coins). That is, you will provide each customer with a list of distinct coin labels that is exactly k times as valuable as their original set of coins.

Additionally, since you don't remember the exact values of the coins, this condition must hold true for **any** possible values of the coins that are consistent with what you know—you must guarantee correctness with just the information you know.

Given these constraints, you want to give each customer the **shortest** possible list (that is, the list containing the fewest number of coins). Additionally, due to company policy, this list of coins should be given in descending order of their labels.

Input

The first line of input contains a positive integer k ($1 \le k < 10^{4000}$), the amount by which you need to multiply the total values of each customer's set of coins.

The second line of input contains a positive integer n ($1 \le n < 10$), the number of customers you are assigned for.

The i-th of the next n lines of input contain a positive integer n_i, the number of coins that customer i has, followed by n_i distinct integers $l_{i,1}, l_{i,2}, \dots, l_{i,n_i}$ ($|l_{i,j}| \le 10^4$), denoting that their j-th coin has label $l_{i,j}$.

Output

Output n lines, as follows:

The i-th line of output should contain space-separated integers denoting the labels of the coins to provide to customer i.

Examples

Sample 1 Input

```
4
1
3 -2 -1 0
```

Sample 1 Output

```
4 0 -4
```

Sample 1 Explanation

You have one customer, with three coins labeled -2, -1, 0. Suppose the coins had the following values (note that these values *are* consistent with the information you have):

Label	5	4	3	2	1	0	-1	-2	-3	-4	-5
Value	29	18	11	7	4	3	1	2	-1	3	-4

The customer's coins have a total value of 2 + 1 + 3 = 6.
The coins that you chose (the coins labeled 4, 0, and -4) have a total value of 18 + 3 + 3 = 24, which is k times as valuable: $k = 4$, and $6 \times 4 = 24$.

Now suppose the coins had these values instead, which are also consistent with the information you have:

Label	5	4	3	2	1	0	-1	-2	-3	-4	-5
Value	26	16	10	6	4	2	2	0	2	-2	4

Then, the customer's coins have a total value of 2 + 2 + 0 = 4, and the coins that you chose have a total value of 16 + 2 + (-2) = 16, which is also $k = 4$ times as valuable, as desired.

It can be shown that for any values of the coins that are consistent with the information you have, that the coins you chose are always 4 times as valuable as the customer's coins. It can also be shown that 3 is the minimum number of coins you could have chosen: no set of fewer than three coins would have worked.

Sample 2 Input

```
142
3
3 1950 0 -1433
6 5 3 2 0 -2 -4
4 8827 8826 8818 -10000
```

Sample 2 Output

```
1960 1956 1950 1944 1940 10 6 0 -6 -10 -1423 -1427 -1433 -1439 -1443
16 13 7 4 0 -4 -11 -13 -16
8838 8834 8829 8826 8824 8822 8819 8816 8812 8808 -9990 -9994 -10000 -10006 -10010
```

Sample 2 Explanation

In this case, you have three customers.

The first customer has three coins with labels 1950, 0, and -1433. You choose coins labeled 1960, 1956, 1950, 1944, 1940, 10, 6, 0, -6, -10, -1423, -1427, -1433, -1439, -1443. These coins are guaranteed to have a total value of exactly 142 times the total value of the customer's coins. It can be shown that this is the shortest possible list of coins with this property.

The second customer has six coins with labels 5, 3, 2, 0, -2, and -4, and you choose the coins with labels 16, 13, 7, 4, 0, -4, -11, -13, and -16.

The third customer has four coins with labels 8827, 8826, 8818, and -10000. You choose the coins with labels 8838, 8834, 8829, 8826, 8824, 8822, 8819, 8816, 8812, 8808, -9990, -9994, -10000, -10006, -10010.