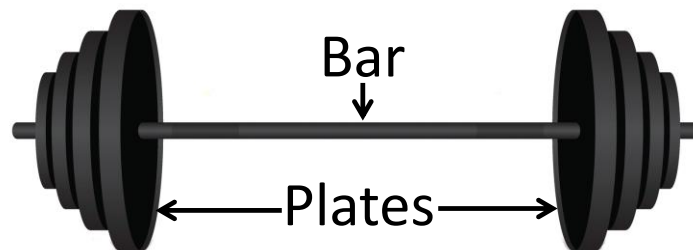




Barbells

Your local gym has b bars and p plates for barbells. In order to prepare a weight for lifting, you must choose a single bar, which has two sides. You then load each side with a (possibly empty) set of plates. For safety reasons, the plates on each side must balance; they must sum to the same weight. The combination of plates on either side might be different, but the total weight on either side must be the same. What weights are available for lifting?



Input

Each input will consist of a single test case. Note that your program may be run multiple times on different inputs. The first line of input contains two integers, b and p ($1 \leq b, p \leq 14$), representing the number of bars and plates. Then, there are b lines each containing a single integer x ($1 \leq x \leq 10^8$) which are the weights of the bars. After that, there are p lines each containing a single integer y ($1 \leq y \leq 10^8$) which are the weights of the plates.

Output

Output a sorted list of all possible lifting weights, one per line. There must be no duplicates.

Sample Input

```
2 5
100
110
5
5
1
4
6
```

Sample Output

```
100
110
112
120
122
130
```