B3 – Barbells

Your local gym has n barbells and m plates. In order to prepare a weight for lifting, you must choose a single barbell, 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 sum to the same weight. What weights are available for lifting?

For example, suppose that there are two barbells weighing 100 and 110 grams, and five plates weighting 1, 4, 5, 5, and 6 grams, respectively. Then, there are six possible weights available for lifting. The table below shows one way to attain the different weights:

Barbell	Left side	Right side	Total
100	0	0	100
100	5	5	110
100	$1+5$	6	112
110	5	5	120
110	$1+5$	6	122
110	$5+5$	$4+6$	130

Input

The first line of input contains the space-separated integers n and m ($1 \leqslant n, m \leqslant 14$). The second line of input contains n space-separated integers $b_1, \ldots, b_n$ ($1 \leqslant b_i \leqslant 10^8$), denoting the weights of the barbells in grams. The third line of input contains m space-separated integers $p_1, \ldots, p_m$ ($1 \leqslant p_i \leqslant 10^8$), denoting the weights of the plates in grams

Output

Print a sorted list of all possible distinct weights in grams, one per line.

Input and output samples

Input:
2 5 100 110 5 5 1 4 6

Output:
100 110 112 120 122 130