Problem G. AtCoder Quality Problem

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	256 mebibytes

You have a set S of n elements. You want to paint each subset of S either red or blue. For each subset s of S, you know that the cost to paint it red is R_s, and the cost to paint it blue is B_s.

Note: you want to paint subsets, not the elements.

There is only one requirement:

- If a and b are two subsets of S of the same color, the subset $a \cup b$ has the same color as a and b.

Find the minimum total cost to paint all 2^n subsets.

Input

The first line contains a single integer n ($0 \le n \le 20$), the number of elements.

The second line contains 2^n integers $R_0, R_1, \ldots, R_{2^n-1}$ ($-10^9 \le R_i \le 10^9$), the costs to paint subsets red.

The third line contains 2^n integers $B_0, B_1, \ldots, B_{2^n-1}$ ($-10^9 \le B_i \le 10^9$), the costs to paint subsets blue.

The subset i ($0 \le i < 2^n$) is a subset consisting of elements j such that the j-th bit in the binary representation of i is 1.

Output

Print one integer: the minimum cost to paint all subsets.

Examples

standard input	standard output
2 -5 9 9 -5 10 -8 -6 3	-16
3 -15 19 19 -5 30 -3 -16 13 29 -6 -14 -7 24 -5 18 11	-22
0 -129363358 227605714	-129363358
1 -120923470 -355154745 -18478014 104068715	-476078215
3 41 38 35 12 5 15 42 18 37 35 39 13 10 14 11 19	173