CMPUT 275 - Tangible Computing **Winter 2020**
Morning Problem: Polynomial Multiplication

Description

Suppose I give you two polynomials, one of degree m and one of degree n. I want to know what polynomial I obtain when I multiply them together.

For example, suppose I give you the degree-2 polynomial $5x^2 + x^1 - 3$, and the degree-3 polynomial $-x^3 + x^1$ (note, any lower-order term that is omitted has an implicit coefficient of 0). The product of these polynomials is:

$$\begin{aligned} &(5x^2 + x^1 - 3) * (-x^3 + x^1) \\ =& -5x^5 + 5x^3 - x^4 + x^2 + 3x^3 - 3x^1 \\ =& -5x^5 - x^4 + 8x^3 + x^2 - 3x^1 \end{aligned}$$

We derive the first line by multiplying all pairs of terms together (recall that for any two terms ax^i, bx^j, their product is abx^{i+j}), and the second by summing together all equal-degree terms.

Input

The first line will consist of two integers $0 \leq m, n \leq 1000$. The next line will consist of $m+1$ space-separated integers, denoting the coefficients of the first polynomial: the first coefficient will be the coefficient for $x^0 = 1$, the second for x^1, and so on up to x^m. All coefficients will have a value at least -1000 and at most 1000, and all coefficients will be specified (any "hidden" term will have a coefficient of 0). The final line will consist of $n+1$ space-separated integers, denoting the coefficients of the second polynomial, in a similar format to the first.

Output

You must output a single line consisting of $m + n + 1$ space-separated integers, denoting the coefficients of the product polynomial, from lowest-degree (i.e. x^0) to the highest (i.e. x^{m+n}). Always output *exactly* this many integers, even if the highest-degree coefficients are 0.

Sample Input 1

```
2 3
-3 1 5
0 1 0 -1
```

Sample Output 1

```
0 -3 1 8 -1 -5
```

Explanation: This is exactly the example in the problem statement; the output corresponds to $0x^0 - 3x^1 + x^2 + 8x^3 - x^4 - 5x^5$.

Sample Input 2

```
0 1
10
4 -3
```

Sample Output 2

```
40 -30
```

Explanation: The output is $(10x^0) * (4x^0 - 3x^1) = 40x^0 - 30x^1$.

Sample Input 3

```
1 1
1 1
1 -1
```

Sample Output 3

```
1 0 -1
```

Explanation: The output is $(x^0 + x^1) * (x^0 - x^1) = x^0 - x^2 = 1 - x^2$.