Problem B. Gachapon

Input file:	*standard input*
Output file:	*standard output*
Time limit:	5 seconds
Memory limit:	512 mebibytes

According to Wikipedia, "a gacha game is a video game that implements the gacha (toy vending machine) mechanic". Similar to loot boxes, gacha games induce players to spend in-game currency to receive a random virtual item.

One of these gacha games is called Step-up Gacha, which means that the player's chances of rolling a rare item are increased each time they roll. For example, the phenomenal game Genshin Impact ensures that you can always draw out four-star items or characters in any ten consecutive rolls.

It would be helpful if we give an abstraction to these rolling rules. Consider a game with 0-star, 1-star, ..., m-star items. Assume that the probability of drawing out an i-star item in a single roll is $\frac{a_i}{\sum_{j=0}^{m} a_j}$. A single draw is a level 0 rolling, and a rolling of level k consists of exactly b_k rounds of level $(k-1)$ rollings. The highest level of a rolling is n.

A level k rolling is legal if it ensures the following:

- at least one item with at least k stars is drawn,
- for all b_k level $(k-1)$ rollings it contains, at least one item with at least $(k-1)$ stars is drawn,
- ...and so on, down to each level 0 rolling (which is a single draw), for which at least one item with at least 0 stars is drawn trivially.

Let p_i be the expected number of i-star items drawn out from a legal n-level rolling, and let q be the probability that an n-level rolling is legal. Find the values p_i and q. To avoid unpleasant huge numbers and divisions by zero, for all $0 \le i \le m$, you should only output the value $(p_i \cdot q) \bmod 998\,244\,353$.

Input

The first line contains two integers m and n: the maximum number of stars and the highest level of a rolling ($1 \le n \le m \le 4000$).

The second line contains $m+1$ integers $a_0, a_1, \ldots, a_m$: the frequencies of rolling items with $0, 1, \ldots, m$ stars ($1 \le a_i \le 4000$).

The third line contains n integers $b_1, b_2, \ldots, b_n$: the number of previous level rollings in a rolling of level $1, 2, \ldots, n$ ($2 \le b_i \le 4000$).

Output

Output $m+1$ lines. The i-th line should contain a single integer: the value of $(p_{i-1} \cdot q) \bmod 998\,244\,353$.

Examples

standard input	*standard output*
2 1 1 1 1 3	554580197 1 1
2 1 89 10 1 10	989586456 1 299473306
3 2 1 1 2 1 2 3	58137752 260406016 517809313 758026833

Note

In the first example, the answers in rational form are: $\frac{8}{9}$, 1, 1.