# Problem E. Quad Kingdoms Chess 2

Quad Kingdoms Chess, or QKC, is very popular in the 605A dormitory of THU (Technical Hammer University).

Little Cyan Fish has many friends in that great university. Today, after a long day of classes, Little X and Little Y decided to play a game of QKC.

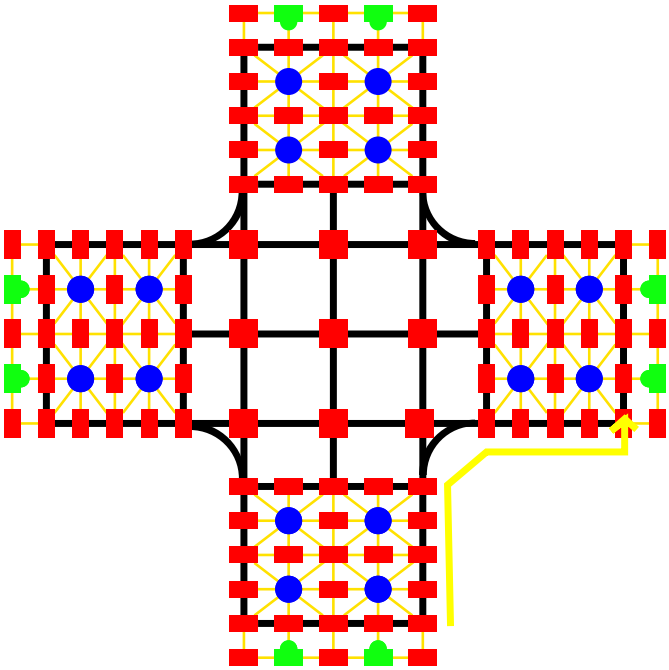

Figure 8: Prepared to play the Quad Kingdom Chess

Unfortunately, they could not gather four players — Little Cyan Fish does not know how to play it! So, to find some joy, they each randomly grabbed a set of pieces and began a trivial game of comparing piece strengths. The simplified game proceeds as follows:

Each piece is represented by an integer $s_i \in [1, 10^5]$. Little X and Little Y each have a collection of pieces. Then, the contest is conducted according to the following rules:

1. Initially, both players arrange their pieces into a sequence, and then shuffle the sequence **uniformly at random**.
2. Then, both players will deploy the first piece in their sequences, denoted as $x$ for Little X and $y$ for Little Y.
3. If $x > y$, Little Y's piece is eliminated, and he must deploy the next piece in his sequence.
4. If $x < y$, Little X's piece is eliminated, and he must deploy the next piece in his sequence.
5. If $x = y$, both pieces are eliminated, and both players deploy the next piece in their sequences.

If at any moment one player cannot deploy a piece while the other still has at least one remaining, the player with remaining pieces wins; if both players run out of pieces simultaneously, the game is declared a draw.

Little Cyan Fish found the game was too simple! So before shuffling the collection, he secretly inserted $k$ **additional** *bombs* into Little X's collection (that is, Little X now has $n + k$ pieces, with $n$ normal pieces and $k$ bombs). When playing the game, a *bomb* always results in mutual elimination when it battles any piece.

Given the collections of pieces for both players, Little Cyan Fish wants to know the probabilities of the game ending with Little X winning, Little Y winning, or drawing, modulo 998 244 353.

## Input

The first line of the input contains three integers $n$, $m$, and $k$ ($1 \le n, m \le 1000$, $0 \le k \le 20$), indicating the number of non-bomb pieces Little X has, the number of pieces Little Y has, and the number of bombs Little Cyan Fish inserted, respectively.

The next line of the input contains $n$ integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 10^5$), indicating the sizes of Little X's non-bomb pieces.

The next line of the input contains $m$ integers $b_1, b_2, \ldots, b_m$ ($1 \le b_j \le 10^5$), indicating the sizes of Little Y's pieces.

## Output

The first line of the output contains a single integer $P_X$, indicating the probability of Little X winning, modulo 998 244 353.

The next line of the output contains a single integer $P_Y$, indicating the probability of Little Y winning, modulo 998 244 353.

The next line of the output contains a single integer $P_=$, indicating the probability of a draw, modulo 998 244 353.

## Examples

| standard input | standard output |
|---|---|
| 5 5 1<br>11 4 2 11 9<br>20 1 6 20 1 | 0<br>1<br>0 |
| 8 7 5<br>58 42 34 58 12 12 9 1<br>28 59 59 1 36 14 7 | 695057094<br>239873545<br>63313715 |
| 8 7 5<br>9 1 2 12 7 7 7 6<br>15 4 15 1 15 11 13 | 673575784<br>13961460<br>310707110 |