

Long Sequence Inversion 2

Input file: **standard input**
Output file: **standard output**
Time limit: **2 seconds**
Memory limit: **1024 megabytes**

In this problem, when we refer to a “permutation of length K ”, we mean a permutation of $(0, 1, \dots, K-1)$. Also, we denote the k -th element (0-based) of a sequence X as $X[k]$.

You are given a permutation P of length L , and L permutations of length B , denoted as V_0, V_1, \dots, V_{L-1} . We define a sequence A of length B^L as follows:

For each $0 \leq n < B^L$, when n is represented as an L -digit number in base B , let $N[i]$ be the value at the B^i place ($0 \leq i < L$). Then,

$$A[n] = \sum_{i=0}^{L-1} V_i[N[i]] \cdot B^{P[i]}$$

Find the inversion number of the sequence A modulo 998244353.

Input

The input is given in the following format:

```
L B
P[0] P[1] ... P[L-1]
V_0[0] V_0[1] ... V_0[B-1]
⋮
V_{L-1}[0] V_{L-1}[1] ... V_{L-1}[B-1]
```

- All input values are integers.
- $1 \leq L$
- $2 \leq B$
- $L \times (B + 1) \leq 5 \times 10^5$
- P is a permutation of length L .
- For each $0 \leq i < L$, V_i is a permutation of length B .

Output

Output the inversion number of the sequence A modulo 998244353.

Examples

| standard input | standard output |
|--|-----------------|
| 3 2 2 0 1 1 0 1 0 0 1 | 14 |
| 2 4 1 0 2 0 3 1 1 2 3 0 | 60 |
| 9 10 2 5 7 3 8 1 4 6 0 9 2 4 0 1 6 7 3 5 8 4 1 6 7 8 0 5 9 2 3 1 9 2 4 6 8 5 7 0 3 9 0 8 2 5 1 6 7 3 4 1 6 0 7 3 9 2 4 5 8 4 5 2 9 1 6 7 3 0 8 7 0 5 6 1 9 2 4 3 8 3 2 1 6 7 0 8 9 4 5 9 2 4 3 5 8 0 6 7 1 | 138876070 |

Note

In the first example, $n = 5$ corresponds to $N = (1, 0, 1)$ in base $B = 2$. Thus,

$$A[5] = V_0[1] \cdot 2^{P[0]} + V_1[0] \cdot 2^{P[1]} + V_2[1] \cdot 2^{P[2]} = 3.$$

By calculating similarly, we get $A = (5, 1, 4, 0, 7, 3, 6, 2)$. The inversion count of A is 14, so the output is 14.

In the second example, $A = (9, 1, 13, 5, 10, 2, 14, 6, 11, 3, 15, 7, 8, 0, 12, 4)$. The inversion count of A is 60, so the output is 60.