Problem B. Basirovich Maxim

Input file:	*standard input*
Output file:	*standard output*
Time limit:	4 seconds
Memory limit:	512 mebibytes

Note that 0-based indexing is used throughout the problem.

You are given an array a of length n and k non-empty sets of integers from 0 to $n-1$. Let S_p denote the p-th set. Each integer from 0 to $n-1$ belongs to exactly one of those sets. It is guaranteed that 0 belongs to S_0.

You choose a nonincreasing array c of nonnegative reals. c_0 must be positive. Let d_p denote $\sum_{i \in S_p} c_i a_i$. Let X denote $\frac{\min_{p=1}^{k-1} d_p}{d_0}$. What is the maximum value of X you can obtain by choosing c accordingly?

Input

The first line contains two integers n and k ($2 \le n \le 4 \cdot 10^4$, $2 \le k \le 4$), the length of a and the number of sets.

The second line contains n integers a_i ($1 \le a_i \le 10^9$), the elements of a.

The third line contains n integers b_i ($b_0 = 0, 0 \le b_i < k$) meaning that i belongs to S_{b_i}.

All sets S_p are non-empty. In other words, all integers from 0 to $k-1$ occur at least once among b_i.

Output

Print a single integer — the maximum value of X you can obtain accurate to absolute or relative error of at most 10^{-4}.

Examples

standard input	standard output
4 4 1 1 1 1 0 1 2 3	1
3 3 3 2 2 0 1 2	0.6666666666666666668
5 4 3 2 1 2 5 0 1 3 0 2	0.29411764686215561816