

3 exercises – each 2 pts

5.1 Longest Increasing Subsequence

Input file: standard input
Output file: standard output
Time limit: 2 seconds
Memory limit: 512 megabytes

Let $A[1..n]$ be an array of integers. Find the largest k ($1 \leq k \leq n$) such that there is a sequence of indices i_1, i_2, \dots, i_k ($1 \leq i_1 < i_2 < \dots < i_k \leq n$) satisfying $A[i_1] < A[i_2] < \dots < A[i_k]$.

For example, an array $A = [5, 3, 2, 4, 6, 1]$ has two longest increasing subsequences $(3, 4, 6)$ and $(2, 4, 6)$.

Input

The first line contains an integer n ($1 \leq n \leq 2000$), the number of elements in A .

The second line contains integers $A[1], A[2], \dots, A[n]$ ($1 \leq A[i] \leq 1\,000\,000$).

Output

The length of the longest increasing subsequence.

Examples

standard input	standard output
6 5 3 2 4 6 1	3
6 1 1 2 2 3 3	3
5 5 4 3 2 1	1

5.2 Edit Distance

Input file: standard input
Output file: standard output
Time limit: 2 seconds
Memory limit: 512 megabytes

Given two strings u and w .

Find the weighted edit distance between u and w , where the cost of inserting is I , the cost of deletion is D , and the cost of substitution is S .

Input

The first line contains two integers n and m ($1 \leq n, m \leq 1000$), the length of strings u and w , respectively.

The strings u and w are given in the second and third lines, respectively. Both strings consist of small Latin letters only.

The forth line contains three integers I , D and S ($1 \leq I, D, S \leq 100$).

Output

The minimal cost to transform u to w by single symbol insertions, deletions, and substitutions.

Examples

standard input	standard output
7 8 editing distance 1 1 1	5
7 8 editing distance 1 1 100	7
7 8 editing distance 100 1 1	105
7 8 editing distance 1 100 1	6

5.4 Make It Sorted

Input file: **standard input**
Output file: **standard output**
Time limit: 2 seconds
Memory limit: 512 megabytes

Let $A[1..n]$ be an array of integers. In one step, you are allowed to add either 1 or -1 to any element of the array. What is the minimum number of steps required to make the array sorted in non-decreasing order ($A[1] \leq A[2] \leq \dots \leq A[n]$)?

Input

The first input line contains one integer n ($1 \leq n \leq 2000$), the number of elements in A .

The second input line contains integers $A[1], A[2], \dots, A[n]$ ($1 \leq A[i] \leq 1000$).

Output

The minimum number of steps required to make the sequence sorted.

Examples

standard input	standard output
3 1 2 1	1
2 5 10	0
7 1 4 2 3 1 4 4	4