Long and Random

Input file:	*standard input*
Output file:	*standard output*
Time limit:	6 seconds
Memory limit:	1024 mebibytes

There is an array a of length n consisting of independent uniformly random integers a_i ($1 \le a_i \le 10^9$). Also, there is an array b of length n consisting of independent uniformly random integers b_i ($0 \le b_i \le 1$).

Laura wants to erase some (possibly zero) elements from array a, then take the prefix of array b with the matching length, and maximize the resulting dot product of the arrays (i.e. $\sum_{i=1}^{m} a_i \cdot b_i$). Help her to do that.

Input

In the first line, there is one integer n ($1 \le n \le 4 \cdot 10^5$)— the length of the arrays a and b.

In the second line, there are n integers $a_1, \ldots, a_n$ ($1 \le a_i \le 10^9$) — the elements of the array a.

In the third line, there are n integers $b_1, \ldots, b_n$ ($0 \le b_i \le 1$) — the elements of the array b.

It is guaranteed that in all tests, except for the first one (from the examples), all numbers a_i and b_i are generated independently from a uniform distribution over the corresponding ranges.

It is guaranteed that there are no more than 20 tests in total.

Output

Print one number — the maximum possible dot product after erasing some elements from array a.

Examples

standard input	*standard output*
8 1 4 6 5 1 2 3 6 1 0 1 0 1 0 0 1	15
4 843693973 430360361 788359887 531088030 1 1 1 0	2163141890

Note

In the first example, we can erase the first, fifth and sixth elements from a. The result will be equal to the dot product of the arrays $[4, 6, 5, 3, 6]$ and $[1, 0, 1, 0, 1]$ which equals $4 \cdot 1 + 6 \cdot 0 + 5 \cdot 1 + 3 \cdot 0 + 6 \cdot 1 = 15$.