CMPUT 274 - Tangible Computing
Morning Problem: Max Product

Description

A vector x in $\mathbb{Z}^n$ is a list of n integers $x_1, x_2, ..., x_n$. Given two vectors x and y in $\mathbb{Z}^n$, their inner product is equal to $x_1 \cdot y_1 + x_2 \cdot y_2 + ... + x_n \cdot y_n$ (the symbol $\cdot$ represents multiplication).

Suppose you are allowed to permute (reorder) the values of x and y any way you like. What is the maximum possible inner product you can obtain by permuting the values of x and y?

Input

There are three lines of input. The first line contains an integer n ($1 \leq n \leq 100,000$) - the number of values in each vector.

The second line of input contains n space-separated integers $x_1, x_2, ..., x_n$ describing the vector x. The third line contains n space-separated integers $y_1, y_2, \ldots, y_n$ describing the vector y. The absolute value of each of these $2n$ integers will not exceed 1000.

Output

Output should consist of one integer - the maximum possible inner product we can obtain by reordering x and y.

Sample Input 1

```
3
1 3 -5
-2 4 1
```

Sample Output 1

```
23
```

Explanation If we kept x the same and reordered y as $1, 4, -2$, the inner product would be $1 \cdot 1 + 3 \cdot 4 + (-5) \cdot (-2) = 1 + 12 + 10 = 23$. No other ordering of x and y achieves a larger inner product.

Sample Input 2

```
5
1 2 3 4 5
1 0 1 0 1
```

Sample Output 2

```
12
```