Question 1   Special Sums

In this problem you are given two lists of N integers, $a_1, a_2, \ldots a_N$ and $b_1, b_2, \ldots b_N$. For any pair (i, j) with $i, j \in \{1, 2, \ldots, N\}$, we define the segment from i to j, written as $[i, j]$, to be $i, i+1, \ldots, j$ if $i \leq j$ and $i, i+1, \ldots, N, 1, 2, \ldots, j$ if $i > j$. Thus if $N = 5$ then the $[2, 4] = \{2, 3, 4\}$ and $[4, 2] = \{4, 5, 1, 2\}$.

With each segment $[i, j]$ we associate a special sum $SSum[i, j]$ as follows:

- $SSum[i, i] = a_i$.

- If $i \neq j$ then $SSum[i, j] = a_i + (\sum_{k \in [i,j], k \neq i,j} b_k) + a_j$. The positions i and j contribute a_i and a_j, respectively, to the sum while every other position k in $[i, j]$ contributes b_k.

Suppose $N = 5$ and that the two given sequences are as follows:

i	1	2	3	4	5
a_i	2	3	2	3	1
b_i	3	4	4	6	3

Then, $SSum[1, 1] = 2$, $SSum[2, 4] = 3 + 4 + 3 = 10$ and $SSum[4, 2] = 3 + 3 + 3 + 3 = 12$. Your aim is to compute the maximum value of $SSum[i, j]$ over all segments $[i, j]$. In this example you can verify that this value is 18 ($SSum[2, 1] = 18$).

Input format

- The first line contains a single positive integer N.

- This is followed by a line containing N integers giving the values of the a_is and this is followed by a line containing N integers giving the values of the b_is.

Output format

A single integer in a single line giving the maximum possible special segment sum.

Note The final value may not fit in a 32 bit integer. Use variables of an appropriate type to store and manipulate this value (`long long` in C/C++, `long` in Java).

Test Data

You may assume that $-10^9 \leq a_i, b_i \leq 10^9$.

Subtask 1 (10 Marks) $1 \leq N \leq 3000$.
Subtask 2 (20 Marks) $1 \leq N \leq 10^6$ and $a_i = b_i$ for all $1 \leq i \leq N$.
Subtask 3 (30 Marks) $3 \leq N \leq 10^6$. Further $a_1 = b_1 = a_N = b_N = -10^9$ and for each $1 < k < N$ we have $-999 \leq a_k, b_k \leq 999$.
Subtask 4 (40 Marks) $1 \leq N \leq 10^6$.

Example

Here is the sample input and output corresponding to the example above.

Sample input

```
5
2 3 2 3 1
3 4 4 6 3
```

Sample output

```
18
```

Time and memory limits

The time limit for this task is 3 seconds. The memory limit is 512 MB.

Note: Your program should not print anything other than what is specified in the output format. Please remove all diagnostic print statements before making your final submission. A program with extraneous output will be treated as incorrect!

Important

Indicate the location of the source code file for your solution to Question 1 in the box below. *If you fail to do this, your solution cannot be evaluated!*

Source file: