IOI Training Camp 2011 – Test 8, 19 June, 2011

Problem 1 Stats Guru

Ravi Shastri is a leading contender for the *Best Strokeless Batsman of All Time* award and he has hired you to support his campaign by providing statistical evidence of his superiority.

Over the N years of his career, you have data about the total runs that he scored in each year, given by $A[1], A[2], \ldots, A[N]$ for $1, 2, \ldots, N$. You also have the number of completed innings in each each year, given by $B[1], B[2], \ldots, B[N]$.

His batting average over a sequence of years $i, i{+}1, \ldots, j$ is given by the usual formula

$$\frac{A[i] + A[i{+}1] + \cdots + A[j]}{B[i] + B[i{+}1] + \cdots + B[j]}$$

Ravi Shastri's competitors in the competition played at different times during his career. To compare himself favourable with each of them, he needs the following information: given a starting year $i \in \{1, 2, \ldots, N\}$ of his career, what is the best value $X[i] \in \{i, i{+}1, \ldots, N\}$ such that his batting average over the span of years $\{i, i{+}1, \ldots, X[i]\}$ is maximized?

For instance, suppose Ravi Shastri played for 4 years and his runs and completed innings are as follows.

i	1	2	3	4
$A[i]$	80	30	50	40
$B[i]$	3	1	3	1

In this case, for $i = 1$ and $i = 2$, his best choice of $X[i]$ is 2 and for $i = 3$ and $i = 4$, his best choice of $X[i]$ is 4.

Your task is to write a program to compute the values $X[i]$ for each i given the information $A[1], A[2], \ldots, A[N]$ and $B[1], B[2], \ldots, B[N]$. If there are multiple options for $X[i]$, choose the smallest one.

Input format

The first line of input is a single integer N, the number of years for which you have Ravi Shastri's batting statistics. The second line of input contains N space separated integers, $A[1], A[2], \ldots, A[N]$, the runs scored in years $1, 2, \ldots, N$. The third line of input contains N space separated integers, $B[1], B[2], \ldots, B[N]$, the number of completed innings in years $1, 2, \ldots, N$.

Output format

Your output should consist of a single line with N space separated integers corresponding to the values $X[1], X[2], \ldots, X[N]$ as described in the problem statement.

Test Data

In all substasks, $1 \leq A[i], B[i] \leq 1000$.

- *Subtask 1 (20 marks):* $1 \leq N \leq 3000$.
- *Subtask 2 (80 marks):* $1 \leq N \leq 10^6$.

Sample input

```
4
80 30 50 40
3 1 3 1
```

Sample output

```
2 2 4 4
```

Time and memory limits

The time limit for this task is 3 seconds. The memory limit is 64 MB.