Analysis mode

English (en) ⌄

Farmer John is growing N ($1 \le N \le 2 \cdot 10^5$) plants of asparagus on his farm! However some of his plants have genetic differences, so some plants will grow faster than others. The initial height of the ith plant is h_i inches, and after each day, the ith plant grows by a_i inches.

FJ likes some of his plants more than others, and he wants some specific plants to be taller than others. He gives you an array of distinct values $t_1, \ldots, t_N$ containing all integers from 0 to $N - 1$ and he wants the ith plant to have exactly t_i other plants that are taller than it. Find the minimum number of days so that FJ's request is satisfied, or determine that it is impossible.

INPUT FORMAT (input arrives from the terminal / stdin):

The first will consist of an integer T, denoting the number of independent test cases ($1 \le T \le 10$).

The first line of each test case consists of an integer N.

The second line consists of N integers h_i ($1 \le h_i \le 10^9$) denoting the initial height of the ith plant in inches.

The third line consists of N integers a_i ($1 \le a_i \le 10^9$) denoting the number of inches the ith plant grows each day.

The fourth line consists of N distinct integers t_i denoting the array that FJ gives you.

It is guaranteed that the sum of N over all test cases does not exceed $2 \cdot 10^5$.

OUTPUT FORMAT (print output to the terminal / stdout):

Output T lines, the answer to each test case on a different line. If it is not possible, output -1.

Note that the large size of integers involved in this problem may require the use of 64-bit integer data types (e.g., a "long long" in C/C++).

SAMPLE INPUT:

```
6
1
10
1
0
2
7 3
8 10
1 0
2
3 6
10 8
0 1
2
7 3
8 9
1 0
2
7 7
8 8
0 1
2
7 3
8 8
1 0
```

SAMPLE OUTPUT:

```
0
3
2
5
-1
-1
```

In the first sample input, there are 6 test cases.

In the first test case, there is only one plant, so the condition is satisfied on day 0.

In the second test case, we need the first plant to be shorter than the second plant. After day 1, the heights are 15 and 13. After day 2, the heights are both 23. After day 3, the heights are 31 and 33, and that's the first day in which the condition is satisfied.

The third and fourth test cases are similar to the second.

In the fifth test case, both plants start with an initial height of 7 and a growth rate of 8. So they will always have identical heights, and therefore the condition is never satisfied.

In the sixth test case, the condition T is not satisfied initially and the growth rates are the same. So the condition can never be satisfied.

SAMPLE INPUT:

```
2
5
7 4 1 10 12
3 4 5 2 1
2 1 0 3 4
5
4 10 12 7 1
3 1 1 4 5
2 4 3 1 0
```

SAMPLE OUTPUT:

```
4
7
```

In the second sample input, there are 2 test cases.

In the first test case, the final heights after day 4 are 19, 20, 21, 18, 16.

In the second test case, the final heights after day 7 are 25, 17, 19, 35, 36.

SCORING:

- Input 3: $N \leq 2$
- Inputs 4-5: $N \leq 50$ and $a_i, h_i \leq 10^3$
- Inputs 6-8: $N \leq 10^3$
- Inputs 9-13: No additional constraints.

Problem credits: Chongtian Ma

Language: C

Source File: Browse... No file selected.

Submit Solution

Note: Many issues (e.g., uninitialized variables, out-of-bounds memory access) can cause a program to produce different output when run multiple times; if your program behaves in a manner inconsistent with the official contest results, you should probably look for one of these issues. Timing can also differ slightly from run to run, so it is possible for a program timing out in the official results to occasionally run just under the time limit in analysis mode, and vice versa. Note also that we have recently changed grading servers, and since our new servers run at different speeds from the servers used during older contests, timing results for older contest problems may be slightly off until we manage to re-calibrate everything properly.