

## Problem G

### Goofy Golf

Goofy is a professional golf player. Today he is playing golf in a 2D cartesian plane, where  $y = 0$  is the ground. The golf field spans from  $x = a$  to  $x = b$  and you can assume that there are infinitely tall posts on  $x = a$  and  $x = b$ .

The ball is currently located on  $x = s$  (i.e. coordinate  $(s, 0)$ ) and the hole is located on  $x = t$  (i.e. coordinate  $(t, 0)$ ). There are also  $N$  trees on the golf field. The  $i^{th}$  tree is located on  $x = P_i$  and is  $H_i$  units tall. In other words, the  $i^{th}$  tree can be represented as a line segment from  $(P_i, 0)$  to  $(P_i, H_i)$ .

In a single golf strike, Goofy can hit the golf ball and it will move from  $(x, 0)$  to  $(x + 2r, 0)$  for any real number (not necessarily integer)  $r$ , and the trajectory of the golf ball is a semi-circle centered at  $(x + r, 0)$  and radius  $|r|$ . The golf ball must not hit any part of a tree except on its top endpoint. The golf ball must also not hit any part of a post. In other words, the golf ball's trajectory must not pass through:

- Any point  $(P_i, y)$  for all  $0 \leq y < H_i; 1 \leq i \leq N$
- Any point  $(a, y)$  and any point  $(b, y)$  for all  $0 \leq y$ .

As standard golf rules, Goofy wants to minimize the number of strikes to move the ball to the hole, i.e. coordinate  $(t, 0)$ . Help Goofy to count the minimum number of strikes required to move the ball from  $(s, 0)$  to  $(t, 0)$ , or indicate if it is impossible to do so.

#### Input

Input begins with a line containing five integers:  $N \ a \ b \ s \ t$  ( $1 \leq N \leq 2000; 0 \leq a < s < t < b \leq 10^9$ ) representing the number of trees, the location of the posts, the initial location of the ball, and the location of the hole, respectively. The next line contains  $N$  integers:  $P_i$  ( $a < P_1 < P_2 < \dots < P_N < b; P_i \neq s; P_i \neq t$ ) representing the location of the trees. The next line contains  $N$  integers:  $H_i$  ( $0 < H_i \leq 10^9$ ) representing the height of the trees.

#### Output

Output in a line an integer representing the minimum number of strikes required to move the ball from  $(s, 0)$  to  $(t, 0)$ , or  $-1$  if it is impossible to do so.

#### Sample Input #1

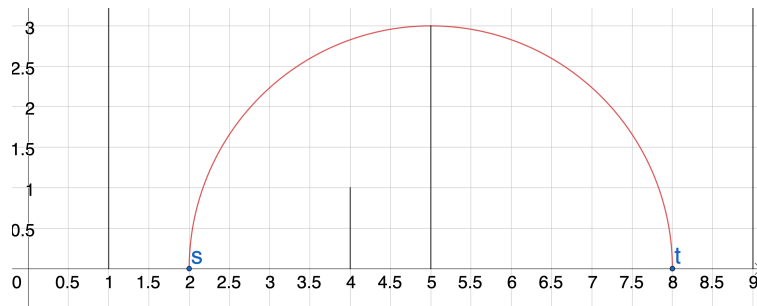
```
2 1 9 2 8
4 5
1 3
```

#### Sample Output #1

```
1
```

### Explanation for the sample input/output #1

The following image is the illustration for the sample case, thus only one strike is required.



### Sample Input #2

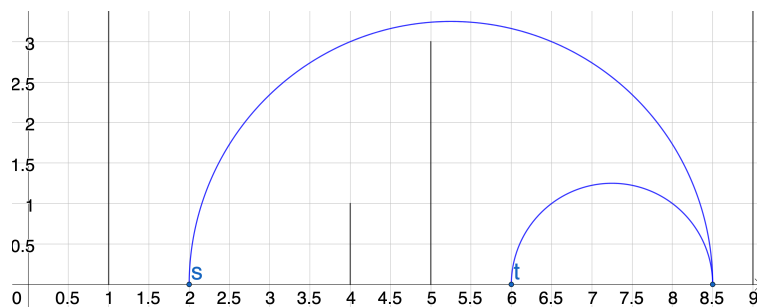
```
2 1 9 2 6
4 5
1 3
```

### Sample Output #2

```
2
```

### Explanation for the sample input/output #2

The following image is the illustration for the sample case, thus two strikes are required.



### Sample Input #3

```
3 1 9 2 8
4 5 6
1 3 4
```

### Sample Output #3

```
-1
```