SWC Test April 20 ‘2016

Track Robot Movement

Question

A robot is placed at any point in a open field.
Robot can move in given four directions -> North (N), South (S), East (E) and West (W)
Maximum **moves** the robot can make is N (1 >= N <= 100)
Also, the distance the robot can **move** in a particular direction is given (1 >= Di <= 1,00,000)

Conditions:
a. No two consecutive moves would be in the same direction
b. If the robot does not intersect the already traversed path, print -1
c. If the robot intersects/overlaps the already traversed path, print the path no.
d. If the robot touches only a point in already traversed path & then deviates, its is not considered as intersection.

Find the fastest intersection the robot will encounter with its earlier visited paths. (Refer to diagrams in next slide)

Input:
The move directions are given as integers, N=1, S=2, E=3, W=4
First line has no of test cases
For each test case, first line has no of moves
From next line to no.of move lines there is direction & distance in integers separated by space

Line 1: No. of test cases (1 ~ 20)
Line 2: No. of moves (1 ~ 100)
Line 3: N_i D_i (1 ~ 1,00,000)
. . . . N_{i+1} D_{i+1}
Line N: Move info N
Next Line: No. of Moves (test case no. 2)

Sample Input:

```
2
4
3 200
1 100
4 100
2 200
4
3 20
1 10
4 20
2 20
```

Sample Output:

```
Case #1 4
Case #2 -1
```

Examples

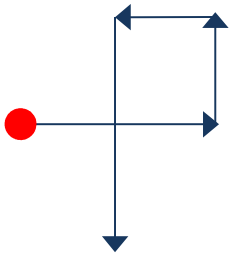

Fig.1 Input: E2 -> N1 -> W1 -> S2
Here, Robot traverses 2 units in East, turns North & traverses 1 unit, then turns West and then turns South and it intersects Path-1
i.e., MoveNo.4 intersects MoveNo.1
Answer: 4

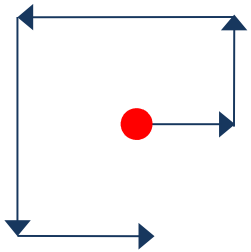

Fig.2 Input: E1 -> N1 -> W2 -> S2 -> E1
Here, there are total 5 moves, but the robot does not intersect any previous moves/paths.
Answer: -1

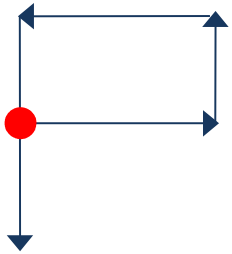

Fig.3 Input: E2 -> N1 -> W2 -> S2
Here, there are total 4 moves, 4th move touches the 1st move's start point but this is not considered an intersection.
Answer: -1

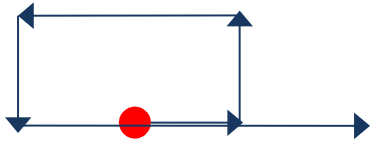

Fig.4 Input: E1 -> N1 -> W2 -> S1 -> E3
Here, there are total 5 moves, out of which the 5th move overlaps with 1st move and hence
Answer: 5

Sample Input & Output (simulated, not actual ones)

Input

8
4
3 2
1 1
4 1
2 2
5
3 1
1 1
4 2
2 2
3 1
4
3 2
1 1
4 2
2 2
5
3 1
1 1
4 2
2 1
3 3
7
3 1
1 1
4 2
2 2
3 2
1 1
3 2
100
3 2
1 2
3 1
1 1
3 1
1 1
3 1
1 1
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3 1
1 1
3 1
1 1
3 1
1 1
3 1
1 1
4 48
2 52
3 1
2 1
2
1 95000
2 97000
8
3 2000
1 2000
3 2000
2 1000
4 1000
1 2000
4 1000
2 6000

Output

Case #1
4
Case #2 -
1
Case #3 -
1
Case #4
5
Case #5 -
1
Case #6
98
Case #7
2
Case #8
6