Test case 1:
No collision
Input:
1
4
2 0
2 2
4 2
4 0
4
0 0
0 1
1 1
1 0
90
1
Output:
0

Test case 2:
Robot with object in path above it
Input:
1
4
0 2
0 4
2 4
2 2
4
0 0
0 1
1 1
1 0
90
5
Output:
(0.0, 2.0) (0.0, 4.0) (2.0, 4.0) (2.0, 2.0)

Test case 3:
Robot with top edge touching object
Input:
1
4
1 1

1 2
2 2
2 1
4
0 0
0 1
1 1
1 0
0
5
Output:
(1.0, 1.0) (1.0, 2.0) (2.0, 2.0) (2.0, 1.0)

Test case 4:
Diagonal movement
Input:
1
4
2 2
2 3
3 3
3 2
4
0 0
0 1
1 1
1 0
45
5
Output:
(2.0, 2.0) (2.0, 3.0) (3.0, 3.0) (3.0, 2.0)

Test case 5:
Diagonal movement with corner touching object
Input:
1
4
0 2
0 3
1 3
1 2
4
0 0
0 1

1 1
1 0
45
5
Output:
(0.0, 2.0) (0.0, 3.0) (1.0, 3.0) (1.0, 2.0)

Test case 6:
Barely touching object at end of path
Input:
1
4
0 5
0 6
1 6
1 5
4
0 0
0 1
1 1
1 0
90
4
Output:
(0.0, 5.0) (0.0, 6.0) (1.0, 6.0) (1.0, 5.0)

Test case 7:
Robot starts inside object
Input:
1
4
-10 -10
-10 10
10 10
10 -10
4
0 0
0 1
1 1
1 0
90
4
Output:
(-10.0, -10.0) (-10.0, 10.0) (10.0, 10.0) (10.0, -10.0)

Test case 8:
Robot starts inside object and crosses edge
Input:
1
4
-10 -10
-10 10
10 10
10 -10
4
0 0
0 1
1 1
1 0
90
20
Output:
(-10.0, -10.0) (-10.0, 10.0) (10.0, 10.0) (10.0, -10.0)

Test case 9:
Multiple object intersections
Input:
2
4
-2 2
-2 3
2 3
2 2
3
-2 5
1 7
2 4
4
0 0
0 1
1 1
1 0
90
10
Output:
(-2.0, 2.0) (-2.0, 3.0) (2.0, 3.0) (2.0, 2.0)
(-2.0, 5.0) (1.0, 7.0) (2.0, 4.0)

Test case 10:

Multiple objects with one intersecting
3
4
-2 2
-2 3
2 3
2 2
3
-5 5
-3 7
-2 4
5
0 8
-1 10
1 11
2 10
2 9
4
0 0
0 1
1 1
1 0
90
6.5
Output:
(-2.0, 2.0) (-2.0, 3.0) (2.0, 3.0) (2.0, 2.0)

Test case 11:
Robot starting offset from origin in the positive x, positive y quadrant
Input:
1
4
0 10
0 11
1 11
1 10
4
3 10
3 11
4 11
4 10
180
5
Output:

(0.0, 10.0) (0.0, 11.0) (1.0, 11.0) (1.0, 10.0)

Test case 12:
Robot starting in the positive x, negative y quadrant
Input:
1
4
10 0
11 0
11 -1
10 -1
4
10 -5
11 -5
11 -6
10 -6
90
10
Output:
(10.0, 0.0) (11.0, 0.0) (11.0, -1.0) (10.0, -1.0)

Test case 13:
Robot starting in the negative x, positive y quadrant
Input:
1
4
-10 10
-10 11
-9 11
-9 10
4
-10 13
-10 14
-9 14
-9 13
270
5
Output:
(-10.0, 10.0) (-10.0, 11.0) (-9.0, 11.0) (-9.0, 10.0)

Test case 14:
Robot starting in the negative x, negative y quadrant
Input:
1

4
-10 -10
-10 -9
-9 -9
-9 -10
4
-10 -5
-10 -4
-9 -4
-9 -5
270
5
Output:
(-10.0, -10.0) (-10.0, -9.0) (-9.0, -9.0) (-9.0, -10.0)

Test case 15:
Robot path crosses x axis
Input:
1
4
5 5
5 7
7 7
7 5
4
5 -5
5 -4
6 -4
6 -5
90
10
Output:
(5.0, 5.0) (5.0, 7.0) (7.0, 7.0) (7.0, 5.0)

Test case 16:
Robot path crosses y axis
Input:
1
4
5 5
5 7
7 7
7 5
4

-5 5
-5 6
-4 6
-4 5
0
10
Output:
(5.0, 5.0) (5.0, 7.0) (7.0, 7.0) (7.0, 5.0)

Test case 17:
Several polygons with many sides efficiency test.
Input:
5
12
300 300
350 350
400 350
450 350
500 300
450 250
400 250
350 250
300 250
250 250
200 250
150 300
8
600 400
625 425
650 425
675 425
700 400
675 375
650 375
625 375
16
0 0
200 0
400 0
400 200
400 400
200 400
0 400
0 200

100 100
200 100
300 100
350 100
350 200
350 300
200 300
100 300
10
500 500
550 525
575 550
600 550
600 500
600 450
575 450
550 475
500 450
450 500
6
200 600
250 625
300 600
250 575
200 575
150 600
4
350 350
350 450
450 450
450 350
45
300
Output:
(300.0, 300.0) (350.0, 350.0) (400.0, 350.0) (450.0, 350.0) (500.0, 300.0) (450.0, 250.0) (400.0, 250.0) (350.0, 250.0) (300.0, 250.0) (250.0, 250.0) (200.0, 250.0) (150.0, 300.0)
(0.0, 0.0) (200.0, 0.0) (400.0, 0.0) (400.0, 200.0) (400.0, 400.0) (200.0, 400.0) (0.0, 400.0) (0.0, 200.0) (100.0, 100.0) (200.0, 100.0) (300.0, 100.0) (350.0, 100.0) (350.0, 200.0) (350.0, 300.0) (200.0, 300.0) (100.0, 300.0)
(500.0, 500.0) (550.0, 525.0) (575.0, 550.0) (600.0, 550.0) (600.0, 500.0) (600.0, 450.0) (575.0, 450.0) (550.0, 475.0) (500.0, 450.0) (450.0, 500.0)

Test case 18:
Many polygons efficiency test.

Input:
10
4
100 100
100 200
200 200
200 100
5
300 300
325 325
350 300
325 275
300 275
6
500 500
525 525
550 500
525 475
500 475
475 500
4
700 100
700 200
800 200
800 100
5
200 600
225 625
250 600
225 575
200 575
6
400 400
425 425
450 400
425 375
400 375
375 400
4
600 600
600 700
700 700
700 600
5

800 300
825 325
850 300
825 275
800 275
4
100 500
100 600
200 600
200 500
6
900 500
925 525
950 500
925 475
900 475
875 500
4
400 100
400 200
500 200
500 100
90
400
Output:
(500.0, 500.0) (525.0, 525.0) (550.0, 500.0) (525.0, 475.0) (500.0, 475.0) (475.0, 500.0)
(400.0, 400.0) (425.0, 425.0) (450.0, 400.0) (425.0, 375.0) (400.0, 375.0) (375.0, 400.0)

Test case 19:
Many polygons with complex structures.
Input:
7
12
150.25 150.75
175.33 162.25
200.42 175.50
225.17 187.75
250.00 200.00
262.50 225.25
275.25 250.00
287.50 275.25
300.00 300.00
287.50 325.25
275.25 350.00

262.50 375.25
12
400.33 150.75
425.67 162.25
450.25 175.50
475.50 187.75
500.00 200.00
512.75 225.25
525.50 250.00
537.25 275.25
550.00 300.00
537.25 325.25
525.50 350.00
512.75 375.25
16
100.50 400.25
125.75 412.50
150.33 425.25
175.67 437.75
200.00 450.00
212.25 475.50
225.75 500.00
237.50 525.25
250.00 550.00
237.50 575.25
225.75 600.00
212.25 625.50
200.00 650.00
175.67 662.25
150.33 675.25
125.75 687.50
12
350.25 400.75
375.33 412.25
400.67 425.50
425.25 437.75
450.00 450.00
462.50 475.25
475.75 500.00
487.25 525.25
500.00 550.00
487.25 575.25
475.75 600.00
462.50 625.25

12
600.33 150.75
625.67 162.25
650.25 175.50
675.50 187.75
700.00 200.00
712.25 225.25
725.75 250.00
737.50 275.25
750.00 300.00
737.50 325.25
725.75 350.00
712.25 375.25
16
300.25 100.75
325.50 112.50
350.33 125.25
375.67 137.75
400.00 150.00
412.75 175.50
425.25 200.00
437.50 225.25
450.00 250.00
437.50 275.25
425.25 300.00
412.75 325.50
400.00 350.00
375.67 362.25
350.33 375.25
325.50 387.50
12
200.33 250.75
225.67 262.25
250.25 275.50
275.50 287.75
300.00 300.00
312.75 325.25
325.25 350.00
337.50 375.25
350.00 400.00
337.50 425.25
325.25 450.00
312.75 475.25
4

325.33 325.67
325.33 425.33
425.67 425.33
425.67 325.67
30.75
225.50
Output:
(350.25, 400.75) (375.33, 412.25) (400.67, 425.5) (425.25, 437.75) (450.0, 450.0) (462.5, 475.25) (475.75, 500.0) (487.25, 525.25) (500.0, 550.0) (487.25, 575.25) (475.75, 600.0) (462.5, 625.25)
(300.25, 100.75) (325.5, 112.5) (350.33, 125.25) (375.67, 137.75) (400.0, 150.0) (412.75, 175.5) (425.25, 200.0) (437.5, 225.25) (450.0, 250.0) (437.5, 275.25) (425.25, 300.0) (412.75, 325.5) (400.0, 350.0) (375.67, 362.25) (350.33, 375.25) (325.5, 387.5)
(200.33, 250.75) (225.67, 262.25) (250.25, 275.5) (275.5, 287.75) (300.0, 300.0) (312.75, 325.25) (325.25, 350.0) (337.5, 375.25) (350.0, 400.0) (337.5, 425.25) (325.25, 450.0) (312.75, 475.25)

Test case 20:
Large number of polygons efficiency test.
Input:
30
4
50 50
50 100
100 100
100 50
4
150 50
150 100
200 100
200 50
4
250 50
250 100
300 100
300 50
4
350 50
350 100
400 100
400 50
4
450 50
450 100

500 100
500 50
4
550 50
550 100
600 100
600 50
4
50 150
50 200
100 200
100 150
4
150 150
150 200
200 200
200 150
4
250 150
250 200
300 200
300 150
4
350 150
350 200
400 200
400 150
4
450 150
450 200
500 200
500 150
4
550 150
550 200
600 200
600 150
4
50 250
50 300
100 300
100 250
4
150 250

150 300
200 300
200 250
4
250 250
250 300
300 300
300 250
4
350 250
350 300
400 300
400 250
4
450 250
450 300
500 300
500 250
4
550 250
550 300
600 300
600 250
4
50 350
50 400
100 400
100 350
4
150 350
150 400
200 400
200 350
4
250 350
250 400
300 400
300 350
4
350 350
350 400
400 400
400 350
4

450 350
450 400
500 400
500 350
4
550 350
550 400
600 400
600 350
4
50 450
50 500
100 500
100 450
4
150 450
150 500
200 500
200 450
4
250 450
250 500
300 500
300 450
4
350 450
350 500
400 500
400 450
4
450 450
450 500
500 500
500 450
4
550 450
550 500
600 500
600 450
4
300 300
300 350
350 350
350 300

0
500
Output:
(250.0, 250.0) (250.0, 300.0) (300.0, 300.0) (300.0, 250.0)
(350.0, 250.0) (350.0, 300.0) (400.0, 300.0) (400.0, 250.0)
(450.0, 250.0) (450.0, 300.0) (500.0, 300.0) (500.0, 250.0)
(550.0, 250.0) (550.0, 300.0) (600.0, 300.0) (600.0, 250.0)
(250.0, 350.0) (250.0, 400.0) (300.0, 400.0) (300.0, 350.0)
(350.0, 350.0) (350.0, 400.0) (400.0, 400.0) (400.0, 350.0)
(450.0, 350.0) (450.0, 400.0) (500.0, 400.0) (500.0, 350.0)
(550.0, 350.0) (550.0, 400.0) (600.0, 400.0) (600.0, 350.0)