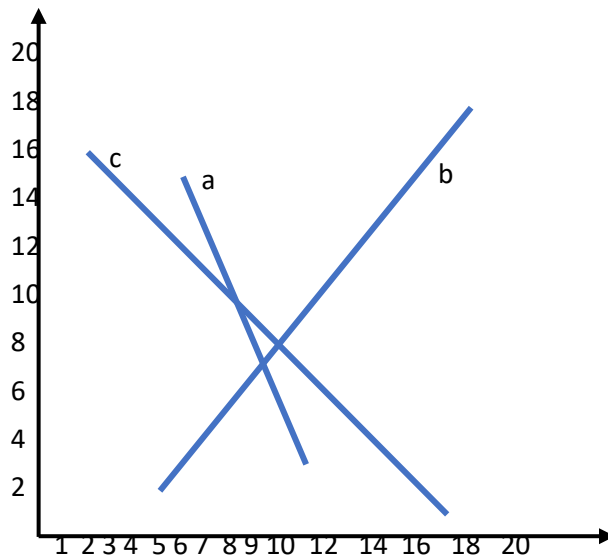


Sample input 4

6
a 10 18 13 19
b 19 1 8 20
c 16 21 3 7
d 2 11 5 8
e 11 12 17 10
f 6 13 20 4

Sample output 4

```
c
8.0 20.0 13.0 19.0 10.0 18.0 6.0 13.0 11.0 12.0 2.0 11.0 17.0 10.0 5.0 8.0 3.0 7.0 20.0 4.0 19.0 1.0
b c
13.0 19.0 10.0 18.0 10.7 15.3 6.0 13.0 11.0 12.0 2.0 11.0 17.0 10.0 5.0 8.0 3.0 7.0 20.0 4.0 19.0 1.0
b a c
10.0 18.0 10.7 15.3 6.0 13.0 11.0 12.0 2.0 11.0 17.0 10.0 5.0 8.0 3.0 7.0 20.0 4.0 19.0 1.0
b c
10.7 15.3 6.0 13.0 11.0 12.0 2.0 11.0 17.0 10.0 5.0 8.0 3.0 7.0 20.0 4.0 19.0 1.0
c b
6.0 13.0 11.0 12.0 2.0 11.0 17.0 10.0 5.0 8.0 3.0 7.0 20.0 4.0 19.0 1.0
f c b
11.0 12.0 7.6 12.0 2.0 11.0 17.0 10.0 5.0 8.0 3.0 7.0 20.0 4.0 19.0 1.0
f c e b
7.6 12.0 13.0 11.3 2.0 11.0 17.0 10.0 5.0 8.0 3.0 7.0 20.0 4.0 19.0 1.0
c f e b
13.0 11.3 2.0 11.0 17.0 10.0 5.0 8.0 3.0 7.0 20.0 4.0 19.0 1.0
c f b e
2.0 11.0 17.0 10.0 5.0 8.0 3.0 7.0 15.6 6.8 20.0 4.0 19.0 1.0
d c f b e
17.0 10.0 4.4 8.6 5.0 8.0 3.0 7.0 15.6 6.8 20.0 4.0 19.0 1.0
d c f b
4.4 8.6 5.0 8.0 3.0 7.0 15.6 6.8 20.0 4.0 19.0 1.0
c d f b
5.0 8.0 3.0 7.0 15.6 6.8 20.0 4.0 19.0 1.0
c f b
3.0 7.0 15.6 6.8 20.0 4.0 19.0 1.0
f b
15.6 6.8 20.0 4.0 19.0 1.0
b f
20.0 4.0 19.0 1.0
b
19.0 1.0
```



Input 2

3

a 11 3 6 15

b 5 2 18 18

c 2 16 17 1

Output 2

b

2.0 16.0 6.0 15.0 11.0 3.0 5.0 2.0 17.0 1.0

c b

6.0 15.0 9.9 8.1 11.0 3.0 5.0 2.0 17.0 1.0

c a b

8.1 9.9 9.9 8.1 9.2 7.2 11.0 3.0 5.0 2.0 17.0 1.0

a c b

9.9 8.1 9.2 7.2 11.0 3.0 5.0 2.0 17.0 1.0

a b c

9.2 7.2 11.0 3.0 5.0 2.0 17.0 1.0

b a c

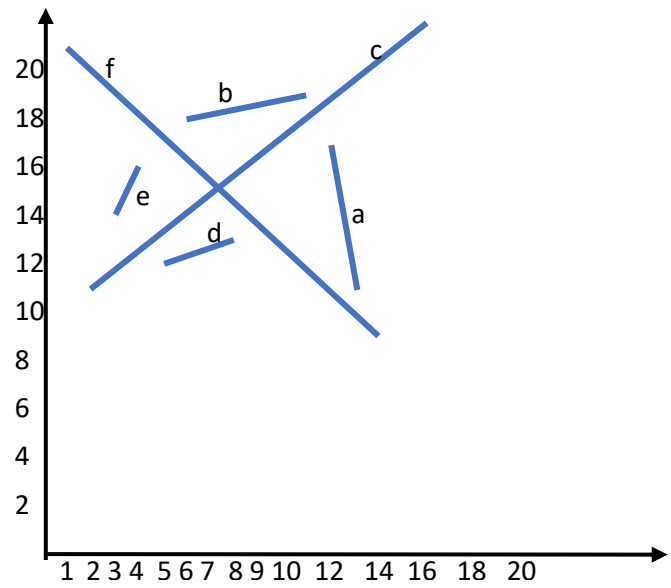
11.0 3.0 5.0 2.0 17.0 1.0

b c

5.0 2.0 17.0 1.0

c

17.0 1.0



Input 3

6

d 5 12 8 13

c 16 22 2 11

b 6 18 11 19

e 3 14 4 16

a 13 11 12 17

f 1 21 14 9

Output 3

c

1.0 21.0 11.0 19.0 6.0 18.0 12.0 17.0 4.0 16.0 3.0 14.0 8.0 13.0 5.0 12.0 2.0 11.0 13.0 11.0 14.0 9.0

f c

11.0 19.0 6.0 18.0 12.0 17.0 4.0 16.0 7.3 15.2 3.0 14.0 8.0 13.0 5.0 12.0 2.0 11.0 13.0 11.0 14.0 9.0

f b c

6.0 18.0 12.0 17.0 4.0 16.0 7.3 15.2 3.0 14.0 8.0 13.0 5.0 12.0 2.0 11.0 13.0 11.0 14.0 9.0

f c

12.0 17.0 4.0 16.0 7.3 15.2 3.0 14.0 8.0 13.0 5.0 12.0 2.0 11.0 13.0 11.0 14.0 9.0

f c a

4.0 16.0 7.3 15.2 3.0 14.0 8.0 13.0 5.0 12.0 2.0 11.0 13.0 11.0 14.0 9.0

e f c a

7.3 15.2 3.0 14.0 8.0 13.0 5.0 12.0 2.0 11.0 13.0 11.0 14.0 9.0

e c f a

3.0 14.0 8.0 13.0 5.0 12.0 2.0 11.0 13.0 11.0 14.0 9.0

c f a

8.0 13.0 5.0 12.0 2.0 11.0 13.0 11.0 14.0 9.0

c d f a

5.0 12.0 2.0 11.0 13.0 11.0 14.0 9.0

c f a

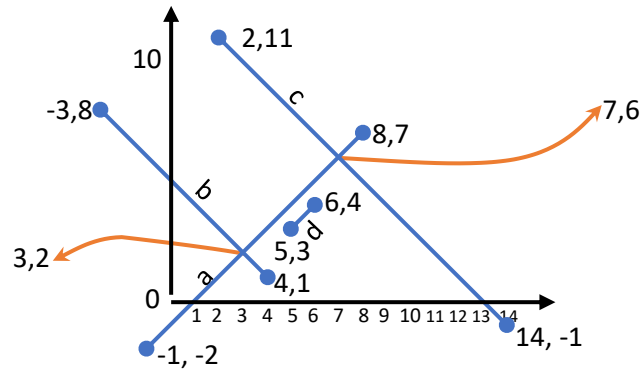
2.0 11.0 13.0 11.0 14.0 9.0

f a

13.0 11.0 14.0 9.0

f

14.0 9.0



Sample input 1

4

a -1 -2 8 7

b -3 8 4 1

c 2 11 14 -1

d 5 3 6 4

Sample output 1

c

-3.0 8.0 8.0 7.0 6.0 4.0 5.0 3.0 4.0 1.0 14.0 -1.0 -1.0 -2.0

b c

8.0 7.0 6.0 4.0 5.0 3.0 4.0 1.0 14.0 -1.0 -1.0 -2.0

b c a

7.0 6.0 6.0 4.0 5.0 3.0 4.0 1.0 14.0 -1.0 -1.0 -2.0

b a c

6.0 4.0 5.0 3.0 3.0 2.0 4.0 1.0 14.0 -1.0 -1.0 -2.0

b a d c

5.0 3.0 3.0 2.0 4.0 1.0 14.0 -1.0 -1.0 -2.0

b a c

3.0 2.0 4.0 1.0 14.0 -1.0 -1.0 -2.0

a b c

4.0 1.0 14.0 -1.0 -1.0 -2.0

a c

14.0 -1.0 -1.0 -2.0

a

-1.0 -2.0

Input 5

6

a 1 13 18 12

b 8 10 12 2

c 3 3 7 21

d 2 9 16 6

e 10 8 19 17

f 17 19 13 4

output 5

c

17.0 19.0 19.0 17.0 1.0 13.0 18.0 12.0 8.0 10.0 2.0 9.0 10.0 8.0 16.0 6.0 13.0 4.0 3.0 3.0 12.0 2.0

cf

19.0 17.0 1.0 13.0 18.0 12.0 8.0 10.0 2.0 9.0 10.0 8.0 16.0 6.0 13.0 4.0 3.0 3.0 12.0 2.0

cfe

15.5 13.5 1.0 13.0 18.0 12.0 8.0 10.0 2.0 9.0 10.0 8.0 16.0 6.0 13.0 4.0 3.0 3.0 12.0 2.0

cef

1.0 13.0 18.0 12.0 8.0 10.0 2.0 9.0 10.0 8.0 16.0 6.0 13.0 4.0 3.0 3.0 12.0 2.0

acef

5.2 12.8 18.0 12.0 8.0 10.0 2.0 9.0 10.0 8.0 16.0 6.0 13.0 4.0 3.0 3.0 12.0 2.0

caef

14.2 12.2 18.0 12.0 8.0 10.0 2.0 9.0 10.0 8.0 16.0 6.0 13.0 4.0 3.0 3.0 12.0 2.0

ceaf

15.2 12.2 18.0 12.0 8.0 10.0 2.0 9.0 10.0 8.0 16.0 6.0 13.0 4.0 3.0 3.0 12.0 2.0

cefa

18.0 12.0 8.0 10.0 2.0 9.0 10.0 8.0 16.0 6.0 13.0 4.0 3.0 3.0 12.0 2.0

cef

8.0 10.0 2.0 9.0 10.0 8.0 16.0 6.0 13.0 4.0 3.0 3.0 12.0 2.0

cbef

2.0 9.0 10.0 8.0 16.0 6.0 13.0 4.0 3.0 3.0 12.0 2.0

dcbef

4.2 8.5 10.0 8.0 16.0 6.0 13.0 4.0 3.0 3.0 12.0 2.0

cdbef

10.0 8.0 9.3 7.4 16.0 6.0 13.0 4.0 3.0 3.0 12.0 2.0

cdbf

9.3 7.4 16.0 6.0 13.0 4.0 3.0 3.0 12.0 2.0

cbdf

13.7 6.5 16.0 6.0 13.0 4.0 3.0 3.0 12.0 2.0

cbfd

16.0 6.0 13.0 4.0 3.0 3.0 12.0 2.0

cbf

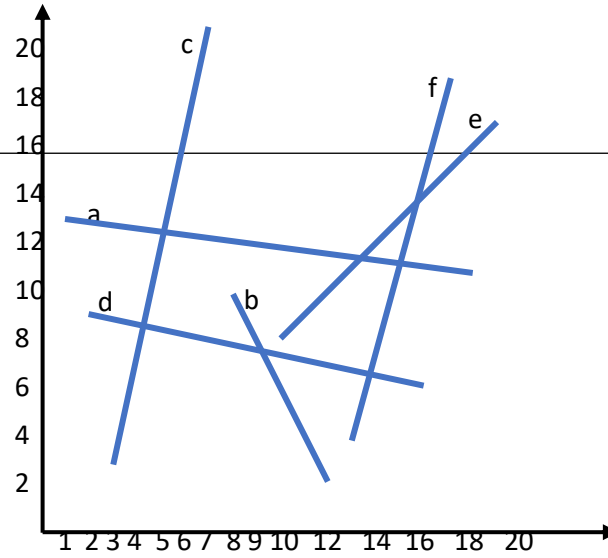
13.0 4.0 3.0 3.0 12.0 2.0

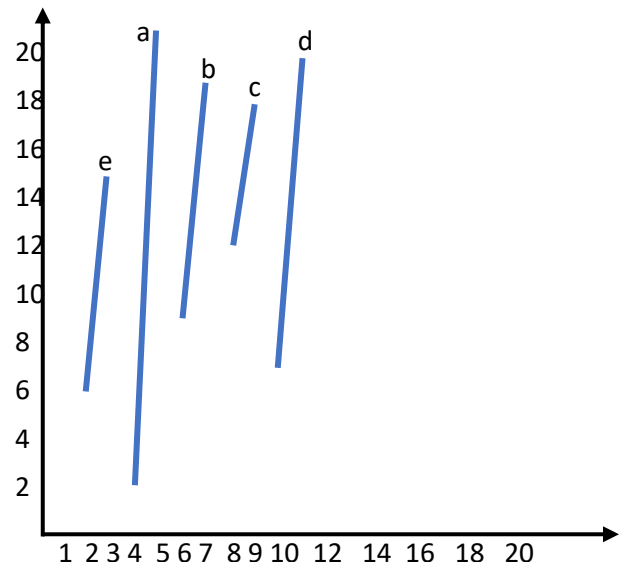
cb

3.0 3.0 12.0 2.0

b

12.0 2.0





Input 6: verifying segment insertion in the right place

5

a 4 2 5 21

e 2 6 3 15

b 6 9 7 19

c 8 12 9 18

d 10 7 11 20

Output 6:

a

11.0 20.0 7.0 19.0 9.0 18.0 3.0 15.0 8.0 12.0 6.0 9.0 10.0 7.0 2.0 6.0 4.0 2.0

a d

7.0 19.0 9.0 18.0 3.0 15.0 8.0 12.0 6.0 9.0 10.0 7.0 2.0 6.0 4.0 2.0

a b d

9.0 18.0 3.0 15.0 8.0 12.0 6.0 9.0 10.0 7.0 2.0 6.0 4.0 2.0

a b c d

3.0 15.0 8.0 12.0 6.0 9.0 10.0 7.0 2.0 6.0 4.0 2.0

e a b c d

8.0 12.0 6.0 9.0 10.0 7.0 2.0 6.0 4.0 2.0

e a b d

6.0 9.0 10.0 7.0 2.0 6.0 4.0 2.0

e a d

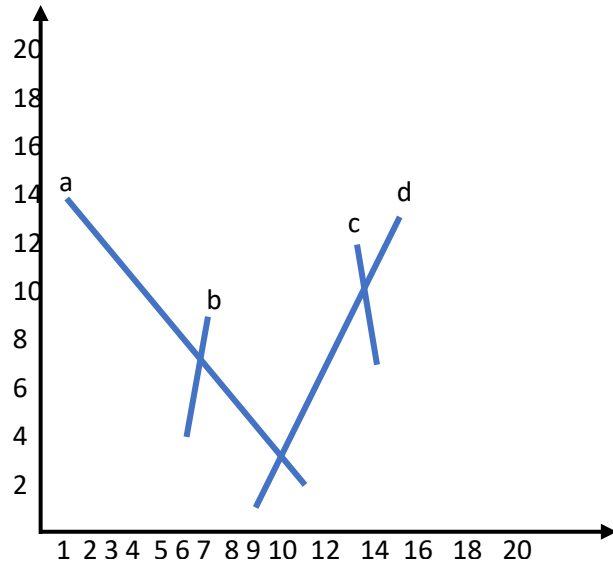
10.0 7.0 2.0 6.0 4.0 2.0

e a

2.0 6.0 4.0 2.0

a

4.0 2.0



input 7: the same intersection point should not be saved more than 1 time

4

b 6 4 7 9

a 1 14 11 2

c 13 12 14 7

d 15 13 9 1

output 7:

a

15.0 13.0 13.0 12.0 7.0 9.0 14.0 7.0 6.0 4.0 11.0 2.0 9.0 1.0

a d

13.0 12.0 7.0 9.0 14.0 7.0 6.0 4.0 10.1 3.1 11.0 2.0 9.0 1.0

a c d

13.4 9.9 7.0 9.0 14.0 7.0 6.0 4.0 10.1 3.1 11.0 2.0 9.0 1.0

a d c

7.0 9.0 14.0 7.0 6.0 4.0 10.1 3.1 11.0 2.0 9.0 1.0

a b d c

6.6 7.2 14.0 7.0 6.0 4.0 10.1 3.1 11.0 2.0 9.0 1.0

b a d c

14.0 7.0 6.0 4.0 10.1 3.1 11.0 2.0 9.0 1.0

b a d

6.0 4.0 10.1 3.1 11.0 2.0 9.0 1.0

a d

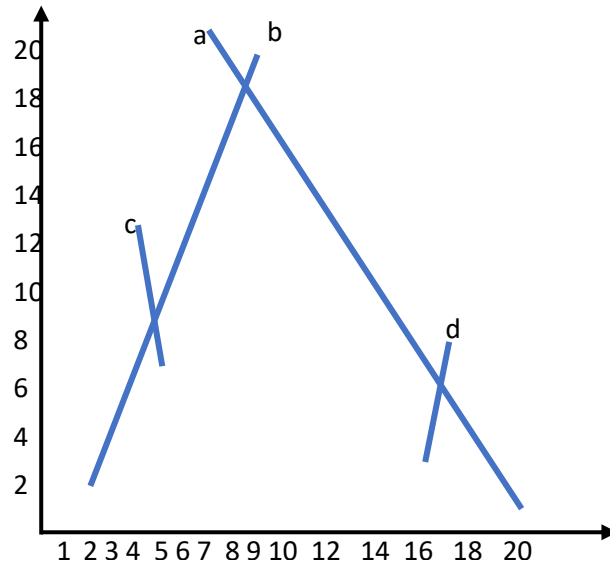
10.1 3.1 11.0 2.0 9.0 1.0

d a

11.0 2.0 9.0 1.0

d

9.0 1.0

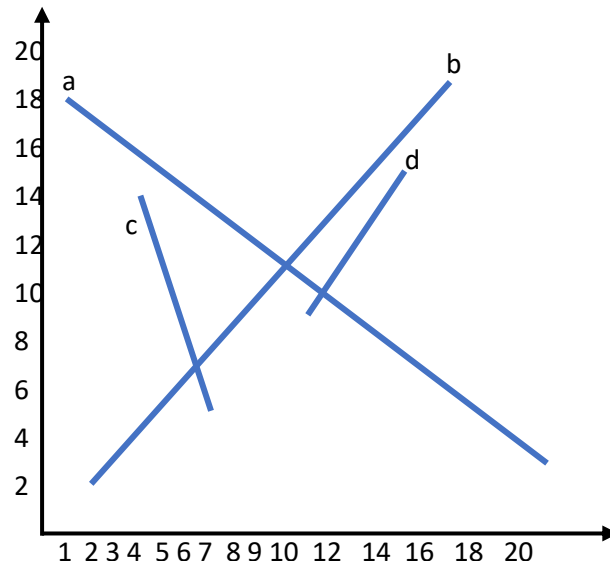


Input 8: an old (and processed) intersection is not stored again

4
c 5 7 4 13
b 2 2 9 20
a 7 21 20 1
d 16 3 17 8

Output 8:

a
9.0 20.0 4.0 13.0 17.0 8.0 5.0 7.0 16.0 3.0 2.0 2.0 20.0 1.0
a b
8.5 18.7 4.0 13.0 17.0 8.0 5.0 7.0 16.0 3.0 2.0 2.0 20.0 1.0
b a
4.0 13.0 17.0 8.0 5.0 7.0 16.0 3.0 2.0 2.0 20.0 1.0
c b a
4.7 8.9 17.0 8.0 5.0 7.0 16.0 3.0 2.0 2.0 20.0 1.0
b c a
17.0 8.0 5.0 7.0 16.0 3.0 2.0 2.0 20.0 1.0
b c a d
5.0 7.0 16.6 6.2 16.0 3.0 2.0 2.0 20.0 1.0
b a d
16.6 6.2 16.0 3.0 2.0 2.0 20.0 1.0
b d a
16.0 3.0 2.0 2.0 20.0 1.0
b a
2.0 2.0 20.0 1.0
a
20.0 1.0



Input 9: double intersection test after processing intersection point event

4

a 1 18 21 3

b 17 19 2 2

c 7 5 4 14

d 11 9 15 15

Output 9:

b

1.0 18.0 15.0 15.0 4.0 14.0 11.0 9.0 7.0 5.0 21.0 3.0 2.0 2.0

a b

15.0 15.0 4.0 14.0 10.1 11.2 11.0 9.0 7.0 5.0 21.0 3.0 2.0 2.0

a b d

4.0 14.0 10.1 11.2 11.0 9.0 7.0 5.0 21.0 3.0 2.0 2.0

c a b d

10.1 11.2 11.0 9.0 7.0 5.0 21.0 3.0 2.0 2.0

c b a d

11.7 10.0 11.0 9.0 6.4 6.9 7.0 5.0 21.0 3.0 2.0 2.0

c b d a

11.0 9.0 6.4 6.9 7.0 5.0 21.0 3.0 2.0 2.0

c b a

6.4 6.9 7.0 5.0 21.0 3.0 2.0 2.0

b c a

7.0 5.0 21.0 3.0 2.0 2.0

b a

21.0 3.0 2.0 2.0

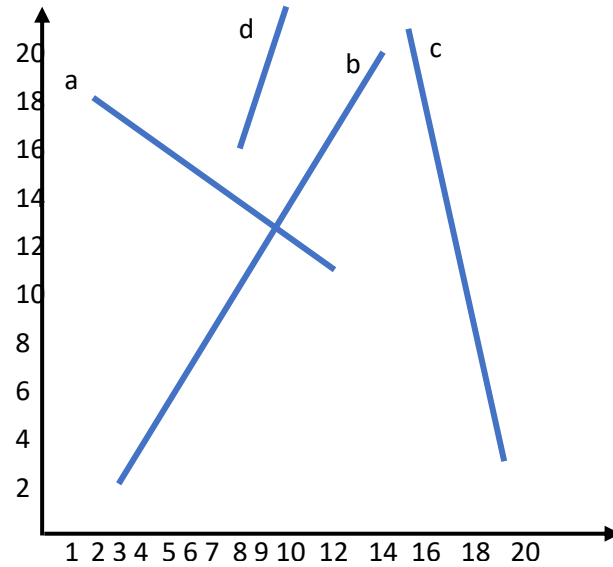
b

2.0 2.0

Base case: check intersection point between adjacent segments after removing a line (d)

input 10:

4
b 3 2 14 20
a 12 11 2 18
c 19 3 15 21
d 8 16 10 22



output 10:

d
15.0 21.0 14.0 20.0 2.0 18.0 8.0 16.0 12.0 11.0 19.0 3.0 3.0 2.0
d c
14.0 20.0 2.0 18.0 8.0 16.0 12.0 11.0 19.0 3.0 3.0 2.0
d b c
2.0 18.0 8.0 16.0 12.0 11.0 19.0 3.0 3.0 2.0
a d b c
8.0 16.0 12.0 11.0 19.0 3.0 3.0 2.0
a b c
9.5 12.7 12.0 11.0 19.0 3.0 3.0 2.0
b a c
12.0 11.0 19.0 3.0 3.0 2.0
b c
19.0 3.0 3.0 2.0
b
3.0 2.0

