

---

## CS19101 Programming and Data Structures: First Lab Test

---

### General instruction to be followed strictly

1. Do not use any global variable unless you are explicitly instructed so.
2. Use proper indentation in your code and comment.
3. Name your file as <roll\_no>\_<assignment\_no>. For example, if your roll number is 14CS10001 and you are submitting assignment 3, then name your file as 14CS10001\_3.c or 14CS10001\_3.cpp as applicable.
4. Write your name, roll number, and assignment number at the beginning of your program.
5. Make your program as efficient as possible.

---

This problem involves rectangles. Whenever we say rectangles, we mean only axis parallel rectangles. The rectangles, in this problem, are represented as the coordinates (of int data type) of the bottom left corner, followed by the length of its side parallel to X-axis, followed by the length of its side parallel to Y-axis. For example, a rectangle whose corner points are (2, 3), (7, 3), (7, 5), (2, 5) is represented as 2 3 5 2. Note that the length of one or two sides of a rectangle are allowed to be zero.

### Part-I

Write a program which takes 10 rectangles as input and checks if there exist any two rectangles such that one contains the other completely inside (not even part of side or corner overlap). For example, the rectangle 2 3 5 3 contains the rectangle 3 4 3 1 completely inside but does not contain the rectangle 5 3 1 1 completely inside. If there exist more than one pair of rectangles such that one contains the other, then print all such pairs. If no such pair exists, there is no need to print anything.

### Part-II

We define the “center” of a rectangle to be the point of intersection of its two diagonals. We also define the distance of a rectangle from a point to be the distance between the point and the center of the rectangle. Sort the rectangles by their distances from the origin.

### Part-III

Let  $\mathcal{X}$  be the set of rectangles among the 10 rectangles which are contained in some other rectangles. Take a point (a, b) (both a and b are of int data type) from the user and sort the set  $\mathcal{X}$  of rectangles by their distances from (a, b).

Submit one (single) C/C++ program.

## Sample Output

```
palash@palash-ThinkPad-X1-Yoga-3rd:~$ ./a.out
Write 10 rectangles
-10000 -10000 20000 20000
0 0 0 0
12 1 23 31
-12 -43 100 332
-23 -98 980 346
-12 45 90 21
-1 -2 3 3
0 2 1 3
322 0 34 1
1 2 5 3
-10000 -10000 20000 20000 contains 0 0 0 0
-10000 -10000 20000 20000 contains 12 1 23 31
-10000 -10000 20000 20000 contains -12 -43 100 332
-10000 -10000 20000 20000 contains -23 -98 980 346
-10000 -10000 20000 20000 contains -12 45 90 21
-10000 -10000 20000 20000 contains -1 -2 3 3
-10000 -10000 20000 20000 contains 0 2 1 3
-10000 -10000 20000 20000 contains 322 0 34 1
-10000 -10000 20000 20000 contains 1 2 5 3
-12 -43 100 332 contains 0 0 0 0
-23 -98 980 346 contains 0 0 0 0
-1 -2 3 3 contains 0 0 0 0
-12 -43 100 332 contains 12 1 23 31
-23 -98 980 346 contains 12 1 23 31
-12 -43 100 332 contains -1 -2 3 3
-12 -43 100 332 contains 0 2 1 3
-12 -43 100 332 contains 1 2 5 3
-23 -98 980 346 contains -12 45 90 21
-23 -98 980 346 contains -1 -2 3 3
-23 -98 980 346 contains 0 2 1 3
-23 -98 980 346 contains 322 0 34 1
-23 -98 980 346 contains 1 2 5 3
Rectangles sorted by distance from origin
-10000 -10000 20000 20000
0 0 0 0
-1 -2 3 3
0 2 1 3
1 2 5 3
12 1 23 31
-12 45 90 21
-12 -43 100 332
322 0 34 1
-23 -98 980 346
```

```
Write a and b: 10000 10000
Inner rectangles sorted by distance from (10000,10000)
-23 -98 980 346
322 0 34 1
-12 -43 100 332
-12 45 90 21
12 1 23 31
1 2 5 3
0 2 1 3
-1 -2 3 3
palash@palash-ThinkPad-X1-Yoga-3rd:~$
```

---

## Policy on Plagiarism

Academic integrity is expected of all the students. Ideally, you should work on the assignment/exam consulting only the material we share with you. You are required to properly mention/cite anything else you look at. Any student submitting plagiarised code will be penalised heavily. Repeated violators of our policy will be deregistered from the course. Read this to know what is plagiarism.