

# ASSIGNMENT 1

## COMPUTATION OF CONVEX HULL

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November 5, 2018

### 1 Problem Specification

In this assignment you will implement the *QuickHull* algorithm to compute convex hull of a given set of points in 2D. Additionally you have to mention its area by making proper modification to the algorithm (you cannot use any separate algorithm and/or formula for area calculation).

### 2 Input

You will have to take input from a file. The first line of the input file is an integer indicating number of points  $n$ . Each of the next  $n$  lines contains a pair of real numbers indicating the  $x$ -coordinate and  $y$ -coordinate of each point.

### 3 Output

Output of your program consists of two parts: console output and graphical output.

**Console Output:** In the first line, you have to print how many corner points (say  $h$ ) your convex hull has. In the following  $h$  lines, print the corner points of the convex hull in anti-clockwise order. In the next line, print the area of the convex hull.

**Graphical Output:** You have to show the points and the convex hull graphically (for example, in OpenGL).

### 4 Sample I/O

Table 1 contains one sample input output. Figure 1 demonstrates sample graphical output.

Input	Output
5	4
0 0	0 0
4 0	4 0
0 4	4 4
4 4	0 4
2 2	16

Table 1: Sample Input Output

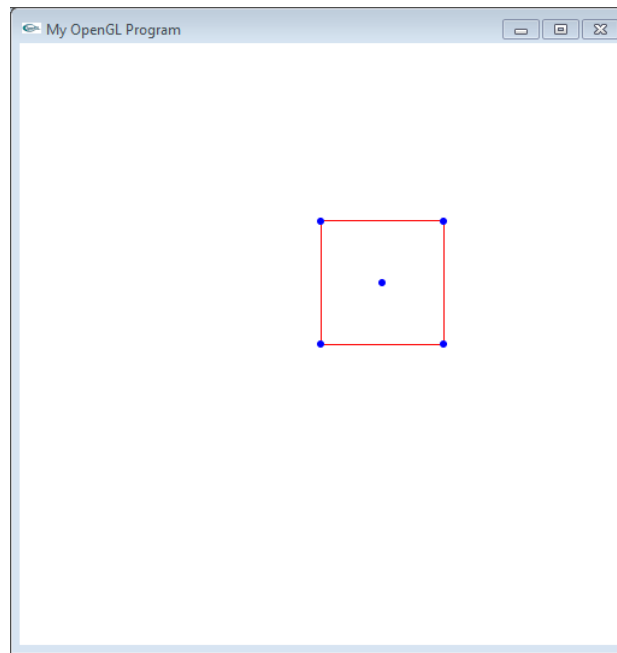


Figure 1: Sample Graphical Output

## 5 Test Cases:

You have to prepare sufficient test cases & test your algorithm with them. These must include, but are not limited to best case & worst case scenarios for *QuickHull* algorithm and some tricky cases (if any).

## 6 Important Notes

Please try to follow the instructions listed below while implementing your assignment:

- Implement using C++/Java programming language
- Be cautious about floating point arithmetic

## 7 Marks Distribution

- Implementation: 13
  - Find Convex Hull: 10
  - Calculate Area: 3
- Test Case: 4
- Console Output: 1
- Graphical Output: 2

## 8 Rules

- You have to submit all your source codes via moodle. All the file names will be in following format

**<your 7 digit student id>\_<additional name>**

For example, a source code file name of the student having 1405999 as student id may look like 1405999\_QuickHull.cpp. Name your input files as <your 7 digit student id>\_input1.txt, <your 7 digit student id>\_input2.txt and so on. **Put all your source files and input files in a folder (even if you put all your codes in only one file) named after your 7 digit student id and create a **zipped** archive of the folder.** Then submit the zip file in moodle. Failure to submit properly will cause 10% deduction.

- **Any type of plagiarism is strongly forbidden. -100% marks will be given to the students who will be found to be involved in plagiarism (from book, internet, from senior/class-mates code etc.). It does not matter who is the server and who is the client.**
- **Prepare for an online evaluation.**

## 9 Deadline

Time- **11:55 pm**

Date- **November 18, 2018**