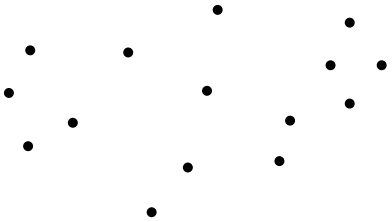
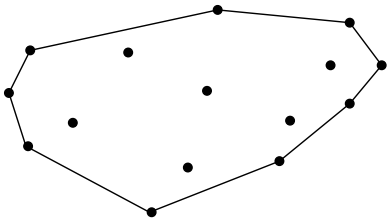
COMP 282 Project 1: Boundaries / Convex Hull (30 points)

Due: September 14 at 23:55

Idea: You have a set of integer lattice points in the plane that you are attempting to surround with a fence. Obviously, there are many ways to do this. However, only one of these ways has the shortest possible fence. Your program will determine which of the points the fence passes through and when given additional points whether they are inside or outside the fence. For example, given this set of points



You would place the fence as shown below.



This is usually referred to as finding the convex hull of a set of points. In class we talked about a couple of possible ways to solve the problem: break it down into many smaller problems (determine whether a point is contained inside a triangle) and finding the upper boundry (sort the points left to right, keep a point if it is above the line between the point before and after) and the lower boundry.

Requirements: Write a java program that reads a set of integer lattice points, prints out the ones on the boundry of the convex hull sorted left to right (ie by x-coordinate), and then accepts additional points and determines whether they are inside or outside the convex hull. There is a sample data file and a sample interaction below.

Your program must have at least one class called Driver1 which runs the program.

You must also have a file called status.txt which contains your name and a short (2-10 sentence) description of the status of your program. This file should be an ascii file. Though you may create it with MS Word (or notepad/wordpad/jGrasp/etc), you should be certain that it is a text file. A sample status.txt file is below.

Comments: You should be using good programming style. At a minimum break the project into appropriate classes, place your name near the top of each file, comment appropriately, be limited to 80 character lines, be limited to 30 line methods (usually shorter), and be properly indent.

Submission: Prior to the deadline upload your files (java and status.txt) to moodle (class files and data files are neither necessary nor wanted). I would suggest uploading long before the deadline and updating/replacing as you go (work on it today and upload, work on it tomorrow and replace, work on it the next day and replace, ...

Sample input.txt file:

```
0 10
0 0
10 0
-10 0
-1 -10
1 -10
2 2
-3 -3
```

Sample interaction:

```
Welcome to Project 1: Boundries
Loading points from input.txt
```

```
The points on the convex hull are:
(-10, 0)
(-1, -10)
(0, 10)
(1, -10)
(10,0)

Test point:
> 5 0
Inside

Test point:
> 8 8
Outside

Test point:
> quit
```

Sample status.txt file:

```
John Noga - Project 1
The program works as required. It compiles/runs and the output matches the
correct format to the letter. However, the style and formatting is incorrect
because I DIDN'T: comment it (didn't even put my name in the file), keep the
length of lines to 80 characters, and keep the length of methods to 30 lines.
```

Cheating: This project is an individual project. You can discuss this project with other students. You can explain what needs to be done and give suggestions on how to do it. You can use the web to find ideas. You cannot share source code with your fellow students or submit solutions written by someone else (including code downloaded from the internet).