

# CMPSC 465 Assignment 03

Shi Qiu

TOTAL POINTS

**31 / 45**

## QUESTION 1

### 1 Problem 1 15 / 15

- ✓ + 1 pts Identified  $p^*$  correctly.
- ✓ + 2 pts  $SC_1$  is correct
- ✓ + 3 pts  $SC_{2a}$  and  $SC_{2b}$  are correct.
- ✓ + 2 pts  $SC_2$  is correct
- ✓ + 2 pts  $SC'$  is correct. Theorem/Recurrence.
- ✓ + 5 pts stack operations at each step are correct
  - + 1.5 pts  $SC_{2a}$  or  $SC_{2b}$  is partially correct.
  - + 1.5 pts  $SC_2$  is partially correct
  - + 1.5 pts  $SC'$  is partially correct.
- Theorem/Recurrence.
- + 3 pts At least 7 operations are correct.
- + 2 pts At least 5 operations are correct.
- + 1.5 pts I don't know how to answer this question.
- 1 pts Did not follow format for Graham-Scan-Core

## QUESTION 2

### 2 Problem 2 5 / 10

- ✓ + 5 pts Provided a proper proof or justification of an algorithm (Although they don't use the duality to justify, they would get full scores if it's correct)
  - + 3 pts Provided  $O(n)$  algorithm
  - + 2 pts Analyzed the running time correctly
  - + 1 pts I don't know how to answer this question.
  - + 2.5 pts partially correct proof
  - + 0 pts Incorrect answer

## QUESTION 3

### 3 Problem 3 2 / 10

- + 2 pts Part 1: Provided a correct visual illustration of the 6 points.
- + 1 pts Part 1: Drew the convex hull in the visual illustration.

+ 1 pts Part 1: Correctly pointed out which point is on the convex hull but not maximal.

+ 1 pts Part 1: Correctly pointed out which point is maximal but not on the convex hull.

✓ + 3 pts Part 2: The 6 points have the correct positional relationships (deduct 0.5 points for each point that doesn't have the correct positional relationship)

+ 2 pts Part 2: The  $p_1$ ,  $p_2$ , and  $p_6$  are on the convex hull.

✓ + 0.5 pts Part 1: "I don't know how to answer this question."

+ 0.5 pts Part 2: "I don't know how to answer this question."

+ 0 pts No/Wrong answer/ 2 hours late submission

- 1.5 Point adjustment

💬 I don't understand Part 2, I give you 1.5 points for the basic 3 points on push.

## QUESTION 4

### 4 Problem 4 9 / 10

- + 10 pts Correct answer
- + 4 pts Incorrect but appropriate running time analysis (e.g. the running time is  $O(ns)$ , where  $s$  is the number of points on the convex hull) or provide  $O(n \log n)$  algorithm.
- + 1 pts I don't know how to answer this question
- + 0 pts Incorrect or empty or more than 2 hours late
- + 9 Point adjustment

💬 most of the concept is correct but you should provide a run time analyzed since this is a long proof question

## QUESTION 5

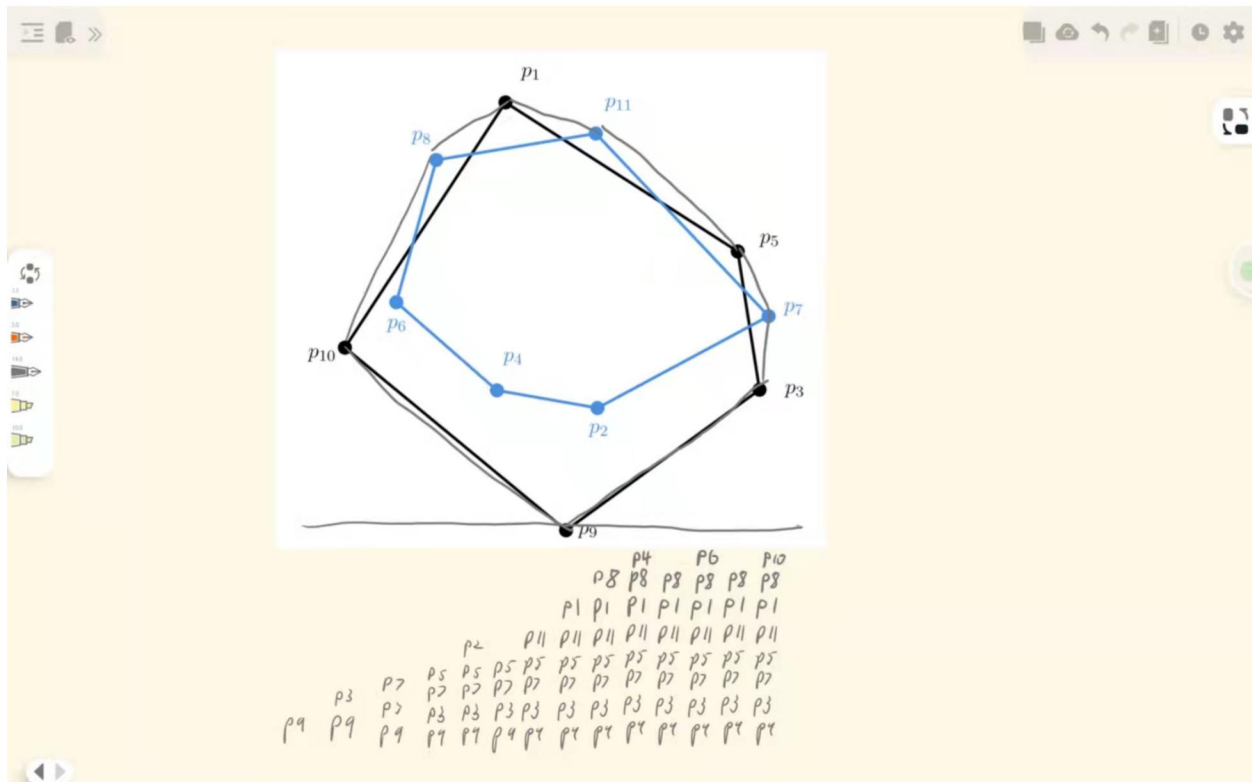
5 Late submission 0 / 0

- **9 pts** late submission. 20% penalty

✓ - **0 pts** No penalty

**Problem 2****Points:**1.1. the lowest point is  $p_9$ 1.2.  $(p_9, p_3, p_5, p_1, p_{10})$ 1.3.  $C_{2a} = (p_7, p_{11}, p_8)$  and  $C_{2b} = (p_2, p_6, p_4)$ 1.4.  $(p_7, p_2, p_{11}, p_4, p_8, p_6)$ 1.5.  $(p_9, p_3, p_7, p_5, p_{11}, p_1, p_8, p_{10})$ 

1.6.

push  $p_9$ push  $p_3$ push  $p_7$ push  $p_5$ push  $p_2$ pop  $p_2$ push  $p_{11}$ push  $p_1$ push  $p_4$

pop p4

push p8

push p6

pop p6

push p10

## 1 Problem 1 15 / 15

- ✓ + 1 pts Identified  $p^*$  correctly.
- ✓ + 2 pts  $SC_1'$  is correct
- ✓ + 3 pts  $SC_{2a}$  and  $SC_{2b}$  are correct.
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  - + 1.5 pts I don't know how to answer this question.
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**Problem 3**

<b>Points:</b>
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2. First, put them in x-y Coordinates, find the left most point L and right most points R load slope a with point L, and check if there is any point above the line, if there is, the new point will be L, loop the process load slope a with point R, and check if there is any point under the line, if there is, the new point will be R, loop the process

and we will have the point b1 b2 as L and R.

run time will be  $O(n)$

## 2 Problem 2 5 / 10

✓ + 5 pts Provided a proper proof or justification of an algorithm (Although they don't use the duality to justify, they would get full scores if it's correct)

+ 3 pts Provided  $O(n)$  algorithm

+ 2 pts Analyzed the running time correctly

+ 1 pts I don't know how to answer this question.

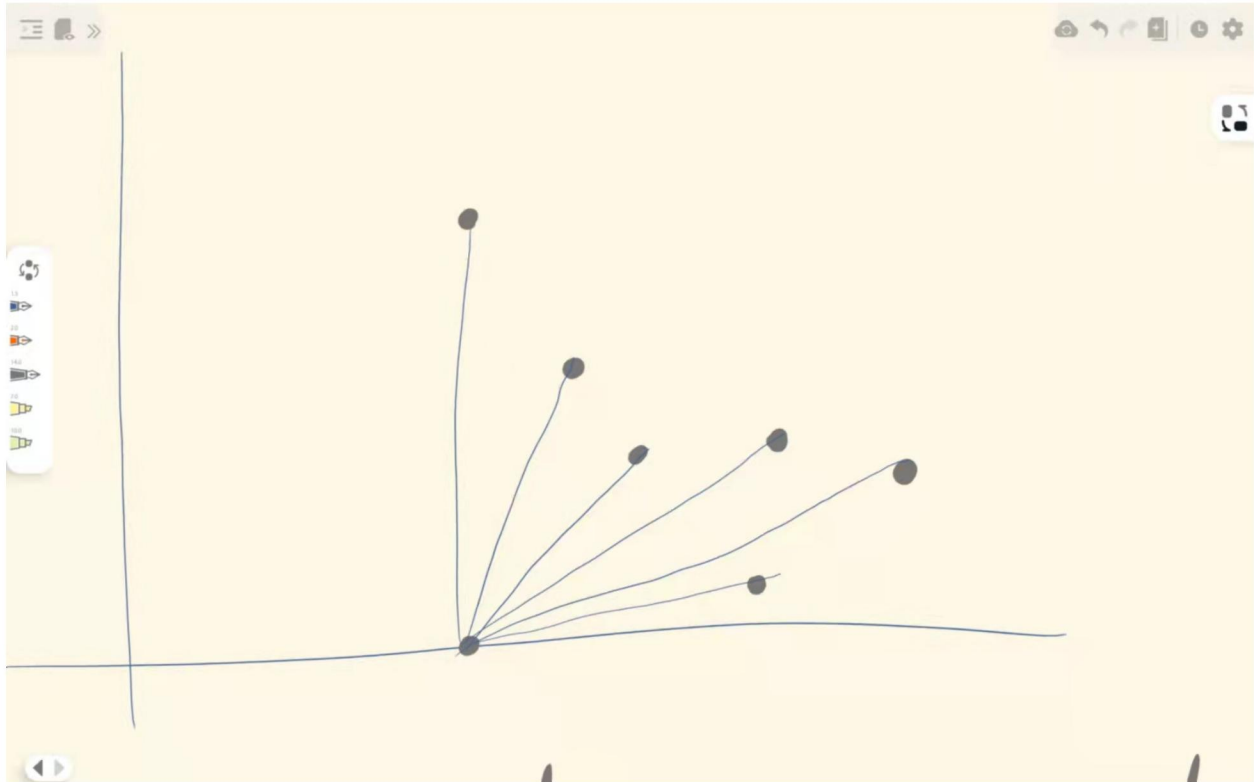
+ 2.5 pts partially correct proof

+ 0 pts Incorrect answer

**Problem 4****Points:**

3.1 I don't know how to answer this question

3.2





### 3 Problem 3 2 / 10

+ 2 pts Part 1: Provided a correct visual illustration of the 6 points.

+ 1 pts Part 1: Drew the convex hull in the visual illustration.

+ 1 pts Part 1: Correctly pointed out which point is on the convex hull but not maximal.

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+ 2 pts Part 2: The p1, p2, and p6 are on the convex hull.

✓ + 0.5 pts Part 1: "I don't know how to answer this question."

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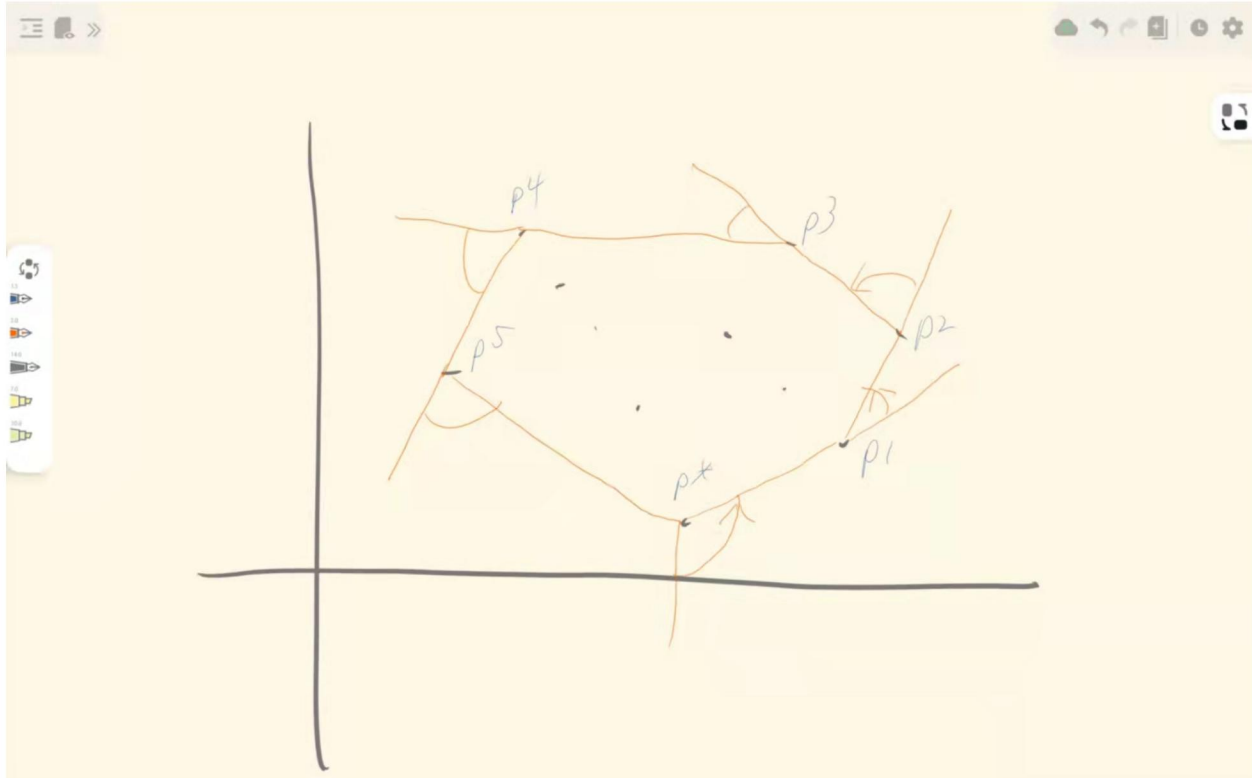
**Problem 5****Points:**

first find the point  $p^*$  with smallest y-coordinate, then draw a line counterclockwise with point  $P^*$  as the center

as the line touch the first point remember angle as  $x$ , mark the new point as center, record the point and draw a line counterclockwise start from the angle  $x$

loop the previous step until you meet the initial  $p^*$  point

and running time will be  $O(n \log n)$



#### 4 Problem 4 9 / 10

+ 10 pts Correct answer

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most of the concept is correct but you should provide a run time analyzed since this is a long proof question

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