CSCI 338: Quiz 3 (due: Friday, March 19, 8:00pm)

Your Name:

This is an open-book quiz (not an attendance counting), so you should try your best. After you finish, upload a pdf file on D2L under Quiz-2. A solution will be posted on D2L after the deadline.

Problem 1

Based on the reduction from Sorting to 2D Convex Hull that was covered on March 15, suppose that the input for Sorting are gicen as $x_1 = 4, x_2 = -3, x_3 = 1, x_4 = 0, x_5 = 3, x_6 = -4, x_7 = -2$.

(1) List the points constructed for the 2D Convex Hull problem. (You must list the coordinates of the points.)

Recall the mapping : $x_i \to (x_i, x_i^2) = P_i$, so we have

$P_1 = (4, 16), P_2 = (-3, 9), P_3 = (1, 1), P_4 = (0, 0), P_5 = (3, 9), P_6 = (-4, 16), P_7 = (-2, 4)$.

(2) Briefly show how the sorted points x_i's are obtained once the 2D convex hull is given.

The 2D CH is a convex hull (polygon) listed as

$\langle P_1, P_6, P_2, P_7, P_4, P_3, P_5 \rangle$ (say using a doubly linked list).

So, start at the leftmost vertex P_6, list all the vertices in counterclockwise order, i.e.,

$P_6, P_2, P_7, P_4, P_3, P_5, P_1$. The x-coordinates of these points give the

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sorted points (or real numbers):

$x_6, x_2, x_7, x_4, x_3, x_5, x_1$.