CS 315 Homework Exercise 4

Due Tuesday, November 20, 2018 by class time

Please do the following **NEATLY IN PENCIL** on paper and submit them to me at the start of class.

Remember to put your name on the sheets of paper.

1. Using the following sequence of numbers in the order given:

   200, 100, 300, 50, 150, 250, 75, 130

   a. Build a BST.
   b. Do a preorder traversal of the tree.
   c. Remove 50 from the BST using the deletion algorithm and draw the tree again.
   d. Remove 300 from the **original** tree using the deletion algorithm and draw the tree again.
   e. Remove 100 from the **original** tree using the deletion algorithm and draw the tree again.

2. Using the same sequence of numbers as in question 2 do the following:(Show all stages of the required procedures.)

   a. Build a **min** heap using the algorithm shown in class.
   b. Use the heap from part (a) to do a heap sort.

3. Given the following array of integers that represents a **max** heap answer the questions below:

Indexes	0	1	2	3	4	5	6	7	8
Values	100	72	88	58	65	44	30	23	

   a. Which indexes have the children of 88? Show how you figured it out.
   b. Which index has the parent of 30? Show how you figured it out.
   c. Using the array, show how 150 would be placed in its correct position in the heap.

4. Give the Big-O of the following operations:

   a. Constructing a BST from n elements.
   b. Constructing a heap from n elements.
   c. Searching a complete BST with n elements.
   d. Searching a heap with n elements.
   e. Removing a leaf of a complete BST.
   f. Removing the root of a heap while maintaining the heap structure.