COMP157 Assignment 5

Exercises 5.1 (Mergesort):

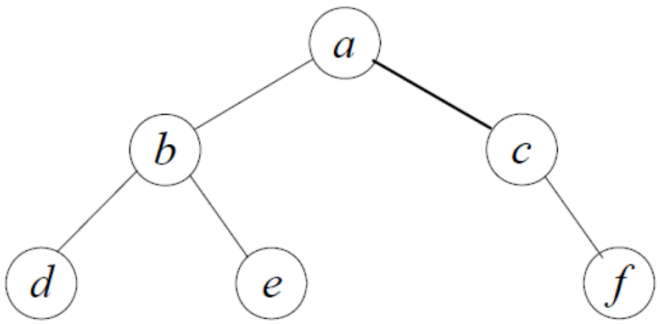
2. a. Write a pseudocode for a divide-and-conquer algorithm for finding values of both the largest and smallest elements in an array of n numbers.

   b. Set up and solve (for $n = 2^k$) a recurrence relation for the number of key comparisons made by your algorithm.

   c. How does this algorithm compare with the brute-force algorithm for this problem?

Exercises 5.3 (Binary Trees):

5. Traverse the following binary tree
   a. in preorder.
   b. in inorder.
   c. in postorder.



Exercises 5.4 (Multiplication):

7. Apply Strassen's algorithm to compute

$$\begin{bmatrix} 1 & 0 & 2 & 1 \\ 4 & 1 & 1 & 0 \\ 0 & 1 & 3 & 0 \\ 5 & 0 & 2 & 1 \end{bmatrix} * \begin{bmatrix} 0 & 1 & 0 & 1 \\ 2 & 1 & 0 & 4 \\ 2 & 0 & 1 & 1 \\ 1 & 3 & 5 & 0 \end{bmatrix}$$

   exiting the recursion when $n = 2$, i.e., computing the products of 2-by-2 matrices by the brute-force algorithm.

Submission Requirements:

- Submit your answers via Canvas.
- All submissions must be typeset. No handwritten work will be accepted.
- Word or PDF formats are preferred. If submitting documents in another format, include a separate text note indicating tools needed to read the document.