Problem Set No. 2

1. Show that every binary tree with L leaves contains a subtree having between $L/3$ and $2L/3$ leaves inclusive.

2. Reword the following statement as a theorem about undirected graphs, and then prove it. Assume that friendship is symmetric but not reflexive.

   If everyone in a group is the friend of at least half the people in the group, then the group can be seated around a table in such a way that everyone is seated between two friends.

3. You are a contestant in a game show in which a prize is hidden behind one of three curtains. You will win the prize if you select the correct curtain. After you have picked one curtain but before the curtain is lifted, the emcee lifts one of the other curtains revealing an empty state, and asks if you would like to switch from your current selection to the remaining curtain. How will your chances change if you switch?

4. Show how to implement a stack using two queues. Analyze the running time of the stack operations.

5. Write an $O(n)$-time nonrecursive procedure that, given an n-node binary tree, prints out the key of each node. Use no more than constant extra space outside of the tree itself and do not modify the tree, even temporarily, during the procedure. Note: assume that the tree is represented as in CLR, figure 11.9, page 274.