Monday, October 19, 11AM

This quiz is worth 10% of final grade

1.
   - If $n = 2^k - 1$ for some $k \geq 1$, is there a unique n node balanced binary search tree in the tree? Explain
   - If $n = 2^k$ for some $k \geq 1$ is there a unique n node balanced binary search tree? Explain

   Hint: For example, you may want to draw (on scratch paper) a balanced binary search tree for identifiers {1,2,3,4,5,6,7} and for {1,2,3,4,5,6,7,8}

2. Consider a data type consisting of a set of records with the following operations:

   Search (i.e., given an integer identifier ID for a record, see if the record is in memory)
   Insert (i.e., add a new record to the memory)
   Delete (delete a record from the memory)
   Select (find the record having the smallest ID)

   Consider a binary search tree and a hash table for this data type.
   You may assume that the number of records n in memory at any point of time satisfies $k \leq n \leq 2k$ for some fixed k. That is, the number of records does not grow or shrink too much over the use of the data structure.

   - What are the pros and cons for using a balanced binary search tree?
   - What are the pros and cons for using a hash table?

3.
   - State two or three great ideas in Turing's seminal work.
   - What if tomorrow a new super computer architecture (even beyond quantum computers) was built that provably violates the Church-Turing thesis. Is there anything in Turing's work that might still be considered a great idea? Note: This is a thought question and one where there is not necessarily any correct answer we are looking for so the question will be graded on the plausability of your answer.