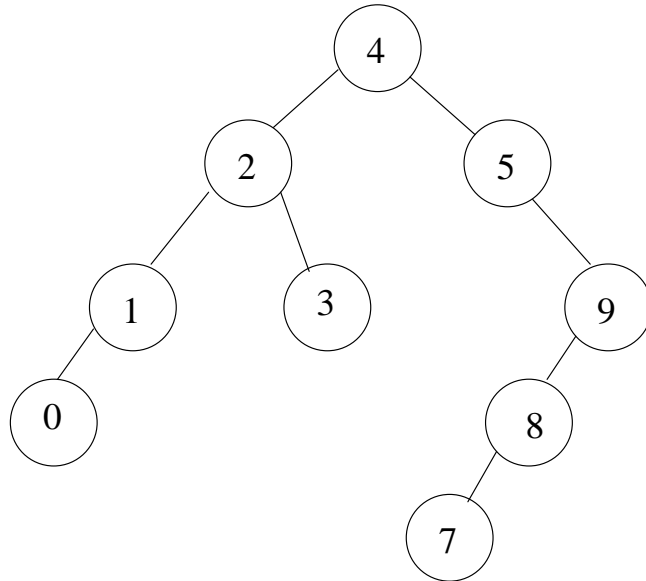CSC 225 Midterm: Fall 1999

Recall that you need at least 40% (40/100) in order to write the final exam in this course.

1.   [10] List the data values according to the order that the cells of the binary tree are visited for each type of traversal listed.

Preorder traversal:

Postorder traversal:

2.   [20] Solve the following recurrence using repeated substitution.
      $T(n) = n + 2\,T(n/2)$, $T(2) = 5$.
      You may assume that $n = 2^k$ for some integer $k \geq 1$.

3.   [20] Prove by induction that your solution to question #1 is correct. Or for part
      marks [10], apply induction to the point where you realize that your solution to #1
      is incorrect, and explain what goes wrong.
      The recurrence from Question #1:
      $T(n) = n + 2\,T(n/2)$, $T(2) = 5$.
      You may assume that $n = 2^k$ for some integer $k \geq 1$.

4.(a) [10] Write down the definition of Ω. Do not use limits in your definition.

(b)   [10] Use your definition from (a) to prove that a polynomial of the form
      $p(n) = q\,n + r\,n^2$ is in $\Omega(n^2)$ where $r > 0$, but there are no restrictions on q.

5.   [30] Write detailed pseudocode (almost C code but without worrying about syntax)
      for: **quicksort(start, end)**
               Input:
               start- pointer to the start of a linked list.
               Output:
               start- pointer to the start of the list created by rearranging the nodes on the
               original list so that the list is sorted.
               end- pointer to the last node on the sorted list.
               You must sort by reassigning the pointers, and are not permitted to move
               data values around. Include lots of comments using the C syntax (enclosed
               by /* */).