1. (25 points) Draw the Decision Tree for Insertion Sort on three elements A, B, C (which start in positions indexed by 1, 2, 3 of the array, respectively). Note that Insertion Sort is inefficient so it does some redundant comparisons; some comparisons will not have two children. In those cases just show the child that can actually occur.

2. (75 points) Assume you have a computer, which we call the Model R computer, that can execute two comparisons at the same time, which we call one round.
   (a) Give an efficient algorithm to find the largest and smallest of four elements (A, B, C, D) on the Model R computer. Try to minimize the number of rounds.
   (b) Draw the Decision Tree for your algorithm (on the four elements A, B, C, D) on the Model R computer.
   (c) What is the relationship between the number of leaves \( L \) and the height \( H \) for a Decision Tree that counts rounds on the Model R computer.
   (d) How many leaves are there for an algorithm that sorts \( N \) elements (on the Model R computer).
   (e) Derive a lower bound for the number rounds it takes the Model R computer to sort \( N \) elements.
   (f) On the midterm exam, we showed that the Model R computer can sort in \( \frac{1}{2}N \lg N + O(N) \) rounds, which is an upper bound for sorting. How does your lower bound compare to this upper bound?