CSCI 3110 Tutorial 6

Reviewed June 21, 2019

1. Solve each of the following recurrences using the Master Theorem or, if the Master theorem is not applicable to the recurrence, state why. If the Master Theorem applies, *state which case is applicable* and show that the recurrence satisfies the conditions of this case.

   (a) $T(n) = 7T(n/3) + n \log n$

   (b) $T(n) = T(n/4) + T(2n/4) + n$

   (c) $T(n) = 3T(n/4) + n$

   (d) $T(n) = 8T(n/2) + n^3$

   (e) $T(n) = 2T(n/5) + n$

2. Solve each of the following recurrences using substitution or a recursion tree. Do not only state your solution—Show how you obtained it. That is, if you use substitution, you must present the complete inductive proof that your solution is correct. If you use a recursion tree, show the recursion tree and discuss how you obtained the solution from the tree. *Note that you are to prove matching upper and lower bounds.*

   (a) $T(n) = 2T(n/3) + n$

   (b) $T(n) = 3T(n/3) + n$

   (c) $T(n) = 4T(n/3) + n$