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Program Structure and Algorithms (INFO 6205)
Quiz #2 – 30 points

Student NAME:

Student ID:

Question 1 (15 points)**.** *Please use the Master method to derive a* $O(\cdot)$ *or* $\Theta(\cdot)$ *complexity for the following recurrences. Please clearly write down the values of* $a, b, d, f(n)$ *and the case numbers to receive full credit.*

(a) *(5 points)* $T(n) = 3T(n/4) + \Theta(n \log n)$.

(b) *(5 points)* $T(n) = 5T(n/2) + n^2 \log n$.

(b) *(5 points)* $T(n) = 4T(n/2) + n^2 \log n$.

Question 2 (15 points)**.** *Consider the following recurrence that we will solve by using recurrence trees.* $T(n) = 2T(n/2) + n$.

(a) *(3 points) How many levels are there in the recursion tree if the size of subproblems at the last level is 1?*

(b) *(3 points) How many leaf nodes are in the tree?*

(c) *(4 points) What is the cost per leaf node and total cost at the last level?*

(d) *(5 points) What is the total cost of the tree (i.e., the sum of costs at all levels)?*