

COMP 550
Algorithms and Analysis
Spring 2020
Homework 2
Due Thursday, January 30, 2020

1. For each of the following pairs of functions, indicate whether $f(n) = o(g(n))$, $f(n) = O(g(n))$, $f(n) = \Theta(g(n))$, $f(n) = \Omega(g(n))$, or $f(n) = \omega(g(n))$.

a) $f(n) = n^2 + 3n - 1$, $g(n) = 2n^2 - 5$.

b) $f(n) = n^3 - 2n^2 + 7$, $g(n) = 10n^2 + 25n - 3$.

c) $f(n) = n^2 * 3^n$, $g(n) = n^3 * 2^n$.

d) $f(n) = n^2 \lg n$, $g(n) = n(\lg n)^2$.

2. Use the master method or recursion trees to give tight asymptotic bounds for the following recurrences:

a) $T(n) = 4T(n/4) + 2n$.

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

Justify your answers briefly.

For this homework you may work in groups of up to four people and groups are encouraged to turn in only one paper with everyone's names in the group on it. This will make the work of the grader easier. However, people in different groups may not collaborate.

Those who want to be part of a group and can't find others may meet in the front after class and form groups, if you desire to. You may also send email to the TA and he will assign people to groups.