

# CSci242, Spring 2019

## Assignment 2

Grant Haataja

January 28, 2019

1. For each of the following  $f(n)$  functions derive the lowest Big Oh,  $O(g(n))$ , inequality, and constants  $c$  and  $n_0$  values for which the inequality will be true:

(a)  $f(n) = 8 + n^3 + 25n \leq 34 * n^3 \forall n \geq 1$   $\boxed{f(n) = O(n^3)}$

(b)  $f(n) = 5n + n^2 + 25n \log n \leq 6 * n^2 \forall n \geq 1$   $\boxed{f(n) = O(n^2)}$

(c)  $f(n) = 1 + n^2 \leq 2 * n^2 \forall n \geq 1$   $\boxed{f(n) = O(n^2)}$

(d)  $2n + n^2 + 5n^3 \leq 8 * n^3 \forall n \geq 1$   $\boxed{f(n) = O(n^3)}$

(e)  $n^3 \leq 1 * n^3 \forall n$   $\boxed{f(n) = O(n^3)}$

(f)  $n^{10} - 4 \leq 1 * n^{10} \forall n$   $\boxed{f(n) = O(n^{10})}$

2. For each of the following  $f(n)$  functions derive the largest Big Omega,  $\Omega(g(n))$ , inequality, and constants  $c$  and  $n_0$  values for which the inequality will be true:

(a)  $f(n) = n^3 + 2 \geq 1 * n^3 \forall n$   $\boxed{f(n) = \Omega(n^3)}$

(b)  $f(n) = 5n \geq 1 * n \forall n$   $\boxed{f(n) = \Omega(n)}$

(c)  $f(n) = 100n + n^2 \geq 1 * n^2 \forall n \geq 0$   $\boxed{f(n) = \Omega(n^2)}$

(d)  $f(n) = 5n^3 \geq 1 * n^3 \forall n$   $\boxed{f(n) = \Omega(n^3)}$

(e)  $n^2 + 3 \geq 1 * n^2 \forall n$   $\boxed{f(n) = \Omega(n^2)}$

(f)  $n \log n \geq 1 * n \log n \forall n$   $\boxed{f(n) = \Omega(n \log n)}$