CSci242, Spring 2019
Assignment 1

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1. For each of the following $f(n)$ functions derive the lowest Big Oh, $O(g(n))$, inequality and state whether your inequality will be true for all values of n or not:

   (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 state whether your inequality will be true for all values of n or not:

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