CS 344 Problem Set 1: Asymptotics

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1. If f(n) = o(g(n)) and g(n) = o(h(n)), we need to show that there exist the cost. C and no such that

a) $f(n) + g(n) \leq c * g(n) \ \forall \ n \geq n_0$

b) $f(n) + g(n) \leq c * h(n) \ \forall \ n \geq n_0$

Since f (n) = O (log n) there exist the cost c1 and n1 such that

$$f(n) \leq c_1 * g(n)$$

Similarly g(n) = O (h(n)) there enlist the cost c2 and n2 such that

$$g(n) \leq c_2 * h(n)$$

Now, let's choose $n_0 \geq \max(n_1, n_2)$ and $C = C_1 + C_2$

$$F(n) + g(n) \leq C_1 * g(n) + C_2 * g(n)$$

$$f(n) \geq O(g(n))$$
and $g(n) = O(h(n))$

$$= (C_1 + C_2) + g(n)$$
$$= C * g(n)$$

Therefore, we show that
$$f(n) + g(n) = O(g(n))$$
Similarly $\quad f(n) + g(n) = O(h(n))$