

**Problem 1**

**Problem 2**

**Problem 3**

**Problem 4**

And if  $C_{avg} \in O(n)$  and  $C_{avg} \in \Omega(n)$  then  $C_{avg} \in \Theta(n)$

### Problem 3

$5lg(n+100)^{100} \rightarrow \ln^2 n \rightarrow \sqrt[3]{n} \rightarrow .001\ln^4 + 3n^3 + 1 \rightarrow 3^n \rightarrow 2^{2n} \rightarrow (n-2)!$

### Problem 4

- a.) If  $f(n) = n$  and  $g(n) = n + \sin(n)$  then  $g(f(n)) = f(n) + \sin(f(n))$  which means that  $g(n) \leq f(n) \therefore g(n) \in O(f(n))$
- b.) If  $f(n) = n$  and  $g(n) = n|\sin(n)|$  then  $g(f(n)) = f(n)|\sin(f(n))|$  which means that  $g(n) \leq f(n) \therefore g(n) \in O(f(n))$