HW5

Alberc Ej Salcedo

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1   Complexity Analysis

1. A: $O(1)$
   The only runs one function which is doNothing, making the order 1.

2. A:$O(n)$
   This has only "n" function it runs.

3. A:$O(n^2 + n)$
   This is a nested for loop and one comparison if statement.

2   Order of Complexity

1. $f(n) = 3n + 2O(n)$
   A: $f(n) = 3n + 2O(n)$
   $Cn \geq 3n + 2 \forall n > n_0$
   $5n \geq 3n + 2 \forall n > n_0$
   $3n + 2n \geq 3n + 2 \forall n > n_0$
   $2n \geq 2 \forall n > 0$

2. $g(n) = 7O(1)$
   A:$O(1)$ is simply just a constant $k = n_0$

3. $h(n) = n^2 + 2n + 4O(n^2)$
   A: Let $Let k = 4$ and we must find $n^2 + 2n + 4c * n^2$
   $(n^2 + 2n + 4)/n^2 < (n^2 + 2n^2 + 4n)/n^2 < (n^2 + 2n + 4n)/n^2 = (7n^2)/n^2$
   $c = 7$ since we are assuming $n \geq 1$, $c * n^2 = 7n^2$. $7n^2 \geq 1$ is true

3 Order of Complexity

1. A: Let $n = 1$
   so that L.H.S. $= 1$
   and R.H.S. $= (n(n+1))/2$
   plugging everything in yields:
   $1 = (1(1+1))/2 = 1$, this statement is true.

2. A: Let $n = 1$
   so that L.H.S. $= 2$
   and R.H.S. $= 2^{n+1} - 2$
   plugging everything in yields:
   $2^{1+1} - 2 = 2^2 - 2 = 2$, this statement is true.