08/01/2021

HW-1 - Time Complexity

3.) There are two steps for finding the time Complexities :-

(i) Observe the fatest growing term

(ii) Remove the coefficients and constants.

(1) $f(n) = 3n^2 + 4n^{3/2}$

now;

Seperating f(n) from constants.

here; the fatest growing term is $3n^2$

hence, the order is $O(n^2)$

(2) $f(n) = (n-5)^2$

$(n-5)^2 = n^2 - 10n + 25$

The fatest growing term is n^2

hence, the order is $O(n^2)$

2.) Algorithm MinMax(A, n)

Input array A of n size

Output max, min elements of A

Ex: A[] = {4, 2, 0, 20}

Output:- Max = 20
Min = 0

Current Max ← A[0]	→ 2
for i ← 1 to n-1 do	→ 1+n+2(n-1)
if A[i] > Current Max	→ 2(n-1)
then current Max ← A[i]	→ 2(n-1)
return Current Max	→ 1
Current Min ← A[0]	→ 2
for i ← 1 to n-1 do	→ 1+n+2(n-1)
If A[i] > Current Min	→ 2(n-1)
then Current Min ← A[i]	→ 2(n-1)
return Current Min	→ 1

Total → 6n - 4

↓

fatest growing

Time complexity = O(n)

~~Space Complexity is~~

1) (A)

Algorithm	Primitive	frequency Count	Total.
1	1	1	1
2	$1+1+2(n-1)$	n	$1+n+2(n-1)$
3	2	n	$2n$
4	$1+1+2(n-1)$	n	$\frac{(1+n+2(n-1))n}{4n}$
5	1	$4n$	
6	$1+1+2(n-1)$	n	$(1+n+2(n-1))n$
7	1	$4n$	$4n$

As nested are present

Time complexity is $O(n^2)$

(B)

1	1	1	1
2	$1+n+2(n-1)$	1	$1+n+2(n-1)$
3	4	n	$4n$
4	1	1	1

Complexity is $O(n)$

(C)

1	1	1	1
2	$1+n+2(n-1)$	1	$1+n+2(n-1)$
3	2	n	$2n$
4	$1+n+2(n-1)$	n	$(1+n+2(n-1))n$
5	5	n	$5n$
6	1	1	1

Time Complexity = $O(n^2)$