Algo-quiz 1

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1 Question1

Answer

(a) O
(b) O
(c) Ω
(d) Ω
(e) Θ
(f) O

2 Question2

Answer
We know that the equation $= n^3$
So for $O(n) = 0 \leq T(n) \leq c \cdot g(n)$

$$T(n) = n^3 \leq n^3 \Rightarrow \leq c_1 \cdot n^3$$

Let $c_2 = 1, T(n) = 0(n^3)$

3 Question3

Answer

$f(n) == \Theta(g(n))$
$g(n) == \Theta(h(n))$
so we can say:
There are positive constants c1, c2 and k, such that:

$$0 \leq c1g(n) \leq f(n) \leq c2g(n)$$

for all $n \geq k$
There are also c3, c4 such that:

$$c3h(n) \leq g(n) \leq c4h(n)$$

for all $n \geq k$
So substitute into the inequality:

$$c1c3h(n) \leq f(n) \leq c2c4h(n)$$

since $c1 \cdot c3 = c'$ and $c2 \cdot c4 = c''$ are both constants, therefore:

$$f(n) = \Theta(h(n))$$

4 Question4

Answer

(a1) $O(n^2)$
(a2) $O(n^2 logn)$
(a3) $O(n)$
(a4) $O(nlogn)$
(a5) $O(n^3 logn)$

(b1) $0(logn)$
(b2) $0(n^2 logn)$

(c) $T(4) = T(\frac{2n}{3}) + 4n$
$2n(log_2) + 4n$
$2n(log_2 4n - 1) + 4n$
$2nlog_2(4n)$

5 Question5

Answer

(a1) the smallest
(a2) n
(a3) A[j]
(a4) smaller
(a5) A[i]
(a6) the smallest
(a7) A[i...n]
(a8) the smallest
(a9) A[n]

(b) $\Theta(n^2 logn)$

6 Question6

Answer

(a) A[l]
(A, l, m)
(A, m+1, r)
return $m_1 > m_2$? $m_1 : m_2$;

(b) 1 , n

(c) $T(n) \leq T(\frac{3n}{2}) + O(n)$

(d) $O(n)$

7 Question7

Answer

(a)

(b)

(c) nooooooooooooooooooooooooooooo