

Assignment 2

1. Prove $7n^2 + 4n + 1$ is $O(n^2)$
2. Prove $7n^6 + 8n^5$ is $O(n^6)$
3. Prove $(n+1)^5$ is $O(n^5)$
4. Prove n is $O(n \log(n))$
5. Prove $n \log(n)$ is $\Omega(n)$
6. The number of operations executed by algorithm A is $192n^5$.
The number of operations executed by algorithm B is $3n^5 \cdot 2^n$.
Determine n_0 such that algorithm A has the same performance as algorithm B for $n \geq n_0$.

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7. The number of operations executed by algorithm A is $25n^3$. The number of operations executed by algorithm B is $5n^3 \cdot \log(n)$. Determine n_0 such that algorithm A has the same performance as algorithm B for $n \geq n_0$.

8. Give the big-Oh characterization in terms of n .

Input: An array A storing $n \geq 1$ of integers

Output: The sum of the prefix sums in A .

```
s ← A[0]
t ← s
for i ← 1 to n – 1 do
    s ← s + A[i]
    t ← t + s
return t
```

9. Given an n -element array X , Algorithm A calls Algorithm B on each element $X[i]$. The B Algorithm runs in $O(i)$ time when it is called on element $X[i]$. What is the worse-case running time on Algorithm A?

10. Order the following functions by asymptotic growth (slowest to fastest) rate: 2^{14} , $n \log(n)$, $200n$, $n^7 + n^3 + 10$, $9n + 10 \log(n)$, $6n \log(n) + 2n$, 2^n , $\log(n)$, $n^2 + 10n$, $2^{\log(n)}$

Assignment must be submitted in a folder. Due at the beginning of class.