

EE 4022: Data Structure

Written Assignment #1

Due: 2017/10/02 14:00

1. Find a closed form solution of $T(n)$ (7.5 pts each. Total 30 pts)

(a) $T(n) = 3T(n/2) + n^2$

(b) $T(n) = 4T(n/2) + n^2$

(c) $T(n) = 16T(n/4) + n$

(d) $T(n) = T(n/2) + 2^n$

2. Prove following formulas (10 pts each. Total 30 pts)

(a) Prove that $n^2 + 3n + 1 = O(n^2)$

(b) Prove that $\log_b n = O(n^k)$, $\forall b > 1$ and $k > 0$

(c) Prove that $n^k = O(b^n)$, $\forall b > 1$ and $k > 0$

3. Prove that $\log(n!) = \Theta(n \log(n))$ (40 pts)