

EL9343 Homework 2

(Due Feb 12, 2022)

No late assignments accepted

1. First use the iteration method to solve the recurrence, draw the recursion tree to analyze.

$$T(n) = T\left(\frac{n}{8}\right) + T\left(\frac{n}{3}\right) + 3n$$

Then use the substitution method to verify your solution.

2. Use the substitution method to prove that $T(n) = 2T\left(\frac{n}{2}\right) + cn\log_2 n$ is $O(n(\log_2 n)^2)$.

3. Solve the recurrence:

$$T(n) = 3T(\sqrt{n}) + (\log n)^2$$

(Hint: Making change of variable)

4. You have three algorithms to a problem and you do not know their efficiency, but fortunately, you find the recurrence formulas for each solution, which are shown as follows:

$$\text{A: } T(n) = 2T\left(\frac{n}{2}\right) + \theta(n)$$

$$\text{B: } T(n) = 2T\left(\frac{9n}{10}\right) + \theta(n)$$

$$\text{C: } T(n) = 2T\left(\frac{n}{2}\right) + \theta(n^2)$$

Please give the running time of each algorithm (In θ notation), and which of your algorithms is the fastest (You probably can do this without a calculator)?