

Solving Recurrences Lecture

▼ First example question:

$$T(n) = 4T\left(\frac{n}{2}\right) + n^2$$

▼ Solving by substitution

- I need to review on this more.

▼ Solving by recursion tree

- Size of the problem is n , so the work we do at each level is n^2 .
- $a = 4$, so we have four subproblems to do, with each sub-problem having $\frac{n}{2}$ problem size.
- The *work* done at each level is the problem size squared, or $\frac{n^2}{4}$. The total work at each level should be n^2 .
- There are $\log_b(n)$ levels in the tree.
- There are $a^{\log_b(n)}$ leaves in the tree.
- $\log_2(n) = 2 \times \log_4(n)$. They're in a constant factor of each other.

▼ Solving by master theorem

- Recurrence is case 2. Therefore it is $\theta(n^2 \lg(n))$.