

DSA - Tutorial 3 Exercise

Total Marks: 15

25-01-2025

Question: Solving the Recurrence Relation (15 points)

Solve the following recurrence relation:

$$T(n) = T\left(\frac{n}{3}\right) + T\left(\frac{2n}{3}\right) + n, \quad T(1) = \mathcal{O}(1).$$

- **(6 points)** Solve the recurrence using the **Substitution Method**.
- **(3 points)** Construct the recursion tree and calculate the total work at each level using the **Tree Method**.
- **(3 points)** Derive the depth of the tree and sum the work across all levels using the **Tree Method**.
- **(3 points)** Show that the solution is $T(n)$ in terms of Asymptotic Notation