

1. Consider the function $T(n)$ defined by the following recurrence:

$$T(n) = \begin{cases} 2 & \text{if } n = 1 \\ 3 + T(\lceil \frac{n}{2} \rceil) & \text{if } n > 1 \end{cases}$$

Prove that $T(n)$ is in $\Theta(\log n)$.