

$$T(n) = 3T\left(\frac{n}{2}\right) + \frac{n}{\log n} \leq 3T\left(\frac{n}{2}\right) + n$$

According to Master Theorem,

$$a=3, \quad b=2, \quad f(n)=n$$

$$\log_b a = \log_2 3$$

$$\text{Case 1: } f(n)=n = O(n^{\log_2 3 - \epsilon}) \text{ where } 0 < \epsilon \leq \log_2 3 - 1$$

$$\text{Therefore } T(n) = O(n^{\log_2 3})$$

Upper bound is $n^{\log_2 3}$

$$T(n) = 3T\left(\frac{n}{2}\right) + \frac{n}{\log n} \geq 3T\left(\frac{n}{2}\right) + c, \quad c \text{ is a constant } > 0$$

According to Master Theorem.

$$a=3, \quad b=2, \quad f(n)=c \cdot n^0$$

$$\text{Case 1: } f(n)=c \cdot n^0 = O(n^{\log_2 3 - \epsilon}) \text{ where } 0 < \epsilon \leq \log_2 3$$

$$\text{Therefore, } T(n) = \Omega(n^{\log_2 3})$$

Lower bound is $n^{\log_2 3}$

$$\text{Therefore, } T(n) = \Theta(n^{\log_2 3})$$