

Dado el siguiente algoritmo:

```
int recursiva (int n) {  
    if (n <= 0)  
        return 43 ;  
    else  
        return recursiva (n/3) ;  
}
```

Deduzca formalmente $O(n)$, mostrando claramente su procedimiento, para la función recursiva.

$$T(n) = \begin{cases} T(\text{condicion}) + T(\text{return}) & \rightarrow 2t & \text{si } n \leq 0 \\ T(\text{condicion}) + T(\text{return}) + T\left(\frac{n}{3}\right) & \rightarrow 2t + T\left(\frac{n}{3}\right) & \text{si } n > 0 \end{cases}$$

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

$$= 2t + \left[2t + T\left(\frac{n}{9}\right)\right] = (2 + 2)t + T\left(\frac{n}{9}\right)$$

$$= 4t + \left[2t + T\left(\frac{n}{27}\right)\right] = (2 + 2 + 2)t + T\left(\frac{n}{27}\right) = 6t + T\left(\frac{n}{27}\right) =$$

$$= (2 + 2 + 2)t + \left[2t + T\left(\frac{n}{81}\right)\right] = (2 + 2 + 2 + 2)t + T\left(\frac{n}{81}\right) = 8t + T\left(\frac{n}{81}\right) =$$

$$T(n) = 2kt + T\left(\frac{n}{3^k}\right)$$

$$T(0) = 2t$$

$$\frac{n}{3^k} = 1 \rightarrow k = \log_3 n$$

$$O(T(n)) = \log_3 n = \frac{\log_2 n}{\log_2 3} = \log_2 n$$

$$\mathbf{O(T(n)) = \log n}$$