Exercisi 2.-

Grandaria del problema: n $T(n) = \begin{cases} 1 & n <= 1 \\ n + 4T(\frac{n}{2}) & n > 1 \end{cases}$

Millor cas: es dona quan $n <= 1$, imprimiht un sól caracter per tant es tracta d'una complexitat constant.

$$\boxed{T(n) = \Omega(1)}$$

Pitjor cas:

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

$= n + n + 4 \cdot 4T(\frac{n}{4}) =$

$= n + n + n + 4 \cdot 4 \cdot 4T(\frac{n}{8}) =$

$\vdots$

$= n + 4^i \cdot T(\frac{n}{2^i}) \cdots \rightarrow$ fins a $\log_2(n)$

$T(n) = \sum_{i=0}^{\log(n)} n + 4^i \cdot T(\frac{n}{2^i}) \rightarrow a \cdot \frac{r^{k+1} - 1}{r - 1} = n \cdot \frac{4^{\log_2(n)+1} - 1}{4 - 1}$

$4^{\log_2(n)+1} \equiv 2^{2(\log_2(n)+1)} = 2^{2\log_2(n)+2}$

$2\log_2(n) \equiv n \longrightarrow 2^{n+2}$ per tant $\boxed{T(n) = O(2^n)}$