Đoàn Ngọc Nam 52000084

Lab 01 part 2 homework

1. Identify the efficiency

b. Solution

- $n \rightarrow T(n)$
- $Basic: n = 1$
- $Worst\ case: A[1] = A[2] = \cdots = A[n]$
- $T(n) = O(1) + T(n-1) + O(1)$
- $T(n) = O(1) + O(1) + \cdots + T(1)$
- $T(n) \in \Theta(n)$

g. Solution:

- $k \rightarrow T(k)$
- $Basic: k = 1$
- $Worst\ case: No$
- $T(k) = T(k-1) + 2$
- $\mathrm{T(k-1) = T(k-1-1) + 2}$
- …
- $\mathrm{T(1) = T(0) + 2 = 2}$
- $\mathrm{T(k) = 2k}$
- $T(k) \in \Theta(k)$

h. Solution:

- $k \rightarrow T(k)$
- $Basic: k = 0$
- $Worst\ case: No$
- $T(k) = 2T(k-1)$
- $\mathrm{T(k-1) = 2T(k-1-1)}$
- …
- $\mathrm{T(1) = 2T(0) = 2}$
- $\mathrm{T(k) = 2^k}$
- $T(k) \in \Theta(2^k)$

i. Solution:

- $k \rightarrow T(k)$
- $Basic: k = 0$
- $Worst\ case: No$

- $T(k) = T(k-1) + O(1)$
- $T(1) = T(0) + O(1) = O(1) + O(1) = O(1)$
- $T(2) = T(1) + O(1) = O(1) + O(1) + O(1) = O(1)$
- $=> T(k) = O(1)$
- $T(k) \in \Theta(1)$