

Lab 5

1)

$$\begin{aligned} \textcircled{1} \quad T(n) &= T(n/2) + c & T(1) &= c_0 \\ n &= 2^k \\ T(2^k) &= T\left(\frac{2^k}{2}\right) + c \\ &= T(2^{k-1}) + c \\ &= T(2^{k-2}) + c + c \\ &\vdots \\ T(2^{k-1}) &= T(n/2) + c \\ &\vdots \\ T(2) + T(2^2) + T(2^3) + \dots + T(2^k) \\ T(1) + T(2) + T(2^2) + \dots + T(2^{k-1}) + kc \\ T(n) &= T(2^k) = T(1) + kc & k &= \log_2 n \\ &= c_0 + kc = c_0 + (\log_2 n) \cdot c \\ &= \boxed{\Theta(\log_2 n)} \end{aligned}$$

2)

Pre-Order: R,A,D,E,X,B,C,N
Post-Order: D,X,B,E,A,N,C,R
In-Order: D,A,X,E,B,R,N,C
Level-Order: R,A,C,D,E,N,X,B