$\frac{7}{\frac{5}{2}}$

2) a) $T(n) = T(n-1) + C$

$T(n-1) = T(n-1-1) + C$

$T(n-1) = T(n-2) + C$

$\boxed{T(n) = T(n-2) + 2C} - 2$

$T(n-2) = T(n-2-1) + C$

$= T(n-3) + C$

$\boxed{T(n) = T(n-3) + 3C} - 3$

$T(n) = T(n-k) + k \cdot C$

$= T(n-(n-1)) + (n-1) \cdot C$

$= 1 + (n-1)C$

$\boxed{= O(n)}$

b) $T(n) = 2T(n/2) + n \quad - 1$

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

$T(n/4) = 2T\left(\frac{n}{8}\right) + \frac{n}{4}$

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

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

$= 2^2 T\left(\frac{n}{4}\right) + 2n$ or $2^2 T\left(\frac{n}{2^2}\right) + 2n$

Subst $\frac{n}{4}$ in this

$= \cancel{2^2 T\left(\frac{n}{\ }\right)}$

$= 2^2 \cancel{\left[2\ 16\right.}$

$= 2^2\left[2T(n/8) + n/4\right] + 2n$

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

$\vdots$

$2^4 T\left(\frac{n}{2^4}\right) + 4n$

$\vdots$ k times

$2^k T\left(\frac{n}{2^k}\right) + kn$

$\frac{n}{2^k} = 1$

$n = 2^k$

$\log n = \log_2 2^k$

$\log n = k \times 1$

$k = \log n$

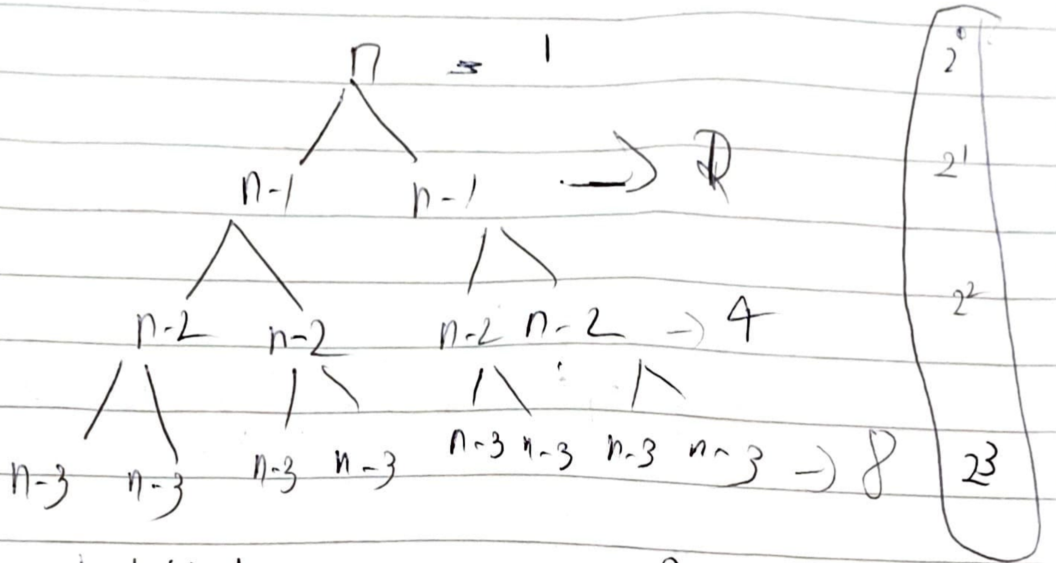
$2^k T(1) + kn$

$n \cdot 1 + n \log n$

$\boxed{O(n \log n)}$

3) $T(n) = 2T(n-1) + 1$

using Recursive tree approach



Left Side

$n - k = 1$

$k = n$

Right

$k = n$

$2^0 + 2^1 + 2^2 + \dots 2^k$

$r = 2$

$$Sum = \frac{a(r^n - 1)}{r - 1}$$

$$= \frac{1(2^n - 1)}{1}$$

$$= 2^n$$

$O(2^n)$

1) $T(2) = 3T(1) + 12 \times 2$ — (1) $T(1) = 3T(0) + 12 \times 1$ — (2)

$T(0) = 5$

Substuite this in (2)

$T(1) = \cancel{3T}\ 3 \times 5 + 12$

$= 27$

Subst this in (1)

$T(2) = 3 \times 27 + 24$

$\boxed{T(2) = 105}$