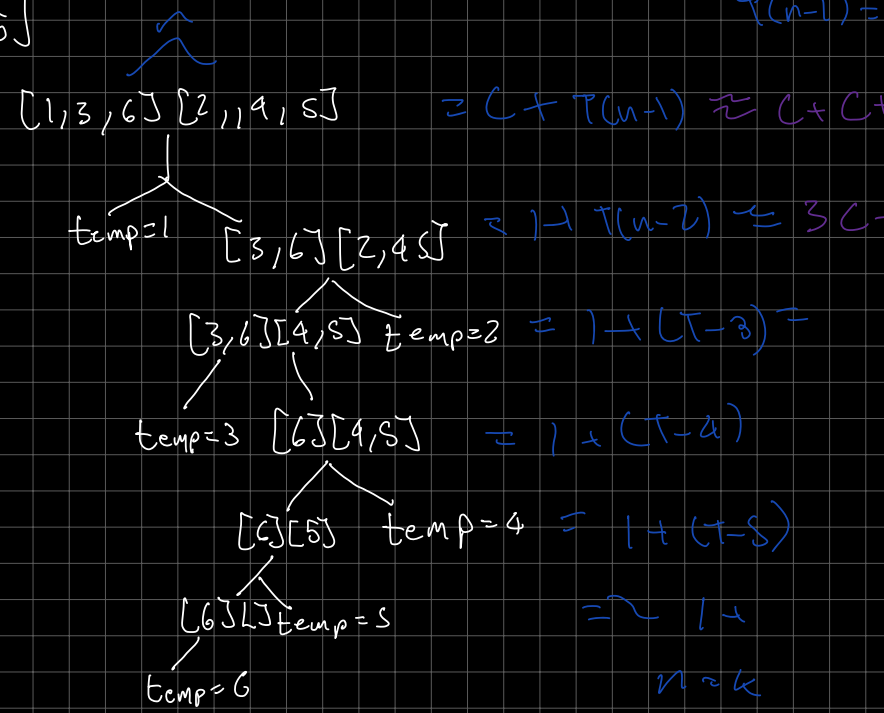
1)

L1 [1,3,6]

L2 [2,4,5]



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

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

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

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

$= 1 + (T-3) =$

$= 1 + (T-4)$

$= 1 +$

$n = 4$

$O(n)$

3) Quicksort complexity

[7,4,6,13,12,3,9,1,8]

Pivot = 1

[1] → n $\frac{n}{2}$

7

[4,6,3,1] [13,12,9,8] → n $\left(\frac{n}{2}\right)\frac{n}{2}$

4 13

[3,1] [6] [12,9,8] [] → n $\frac{n}{2}\frac{n}{2}\frac{n}{2}$

12

[1] [9,8] [] → n

$n \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}$

[1][5] [1,9] → $n \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}$

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

$n = 2^k$

$k = \log_2 n = \text{Depth}$

Depth * Computations

computation = n

$O(n \log n)$

a)

Factorial

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

$T = 6 + T(n-2)$

$3K + T(n-K)$

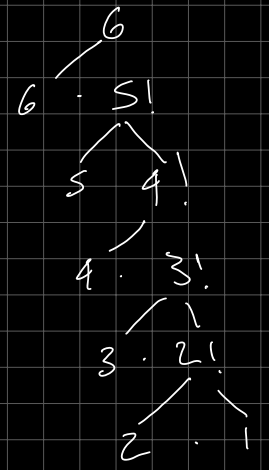
$n - K = 0$

$K = n$

$3n + T(0)$

$3n + 1 = n$ $O(n)$

Factorial memeization



= no memoization

$O(n)$