

(3)

When the partition is even

$$T(n) \leq n \lg n - \frac{n}{2}$$

and $T(n)$ is $O(n \log n)$

B. When the partition is uneven

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

$$\left[T(n-1) = n-2 + T(n-2) \right]$$

$$= (n-1) + (n-2) + T(n-2) \left[T(n-2) = (n-3) + T(n-3) \right]$$

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

after $(n-2)$ steps

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

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

$$= (n-1) + (n-2) + (n-3) + \dots + 1$$

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

$T(n)$ is $O(n^2)$