Finding maximum and minimum Values

Straight forward = $2(n-1)$ comparisons

Divide & Conquer → involves ⇒ $\left(\frac{3n}{2}-2\right)$ comparisons

$$T(n) = \begin{cases} 0 & (n=1) \\ 1 & (n=2) \\ T\left(\frac{n}{2}\right)+T\left(\frac{n}{2}\right)+2 & (n>2) \end{cases}$$

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

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

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

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

$$\vdots$$

$$= 2^{k-1}\,T(2) + \sum_{1\le i\le k-1} 2^i$$

$$= \frac{2^k}{2} + 2^k - 2$$

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

$n = 2^k$

$k=3$, $n=8$

$2^3 = 2^k = n = 8$

$4 = 2^2 = 2^{3-1} = 2^{k-1}$

$T\left(\frac{n}{4}\right) = T\left(\frac{8}{4}\right) = T(2) = 1$

$4+2 = 2+4 = 2+2^2$

$= 2^1 + 2^2 = \sum_{1\le i\le k-1} 2^i$

$i=1$

$i = k-1$
$= 3-1$
$i=2$

$2^3 = 2^k = 8$

$2^k - 2 = 2^3 - 2 = 8-2 = 6$

$= 2+4$