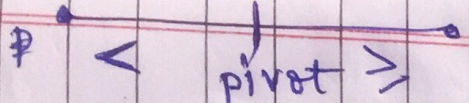
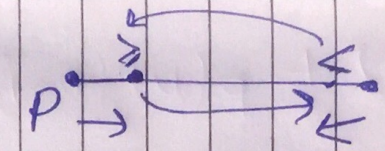
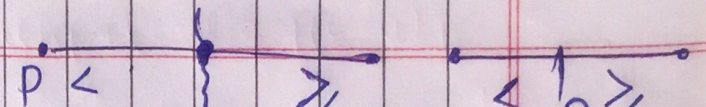
Quicksort

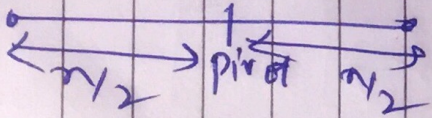






Cases

$O(n \log n)$ — Average / Best case



$T(n) = T(n/2) + T(n/2) + bn$

Partitioning of n $= bn$

$= 2T(n/2) + bn$

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

$= 4T(n/4) + bn + bn$

$= 4T(n/4) + 2bn$

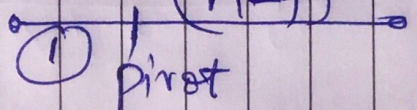
$\Rightarrow 2^k * a + kbn$

$n = 2^k$

$k = 2$

$\Rightarrow an + bn \log n = O(n \log n)$

$O(n^2)$ — Worst case



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

$= T(n-1) + bn$

$= T(n-2) + b(n-1) + bn$

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

$\Rightarrow T(1) + (n-1)bn$

$n = 4$

$= bn(n-1) \Rightarrow O(n^2)$

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