1) Quicksort Worst-Case Complexity

Partitioning of each number:

$$P(n) = O(n)$$

Recursion:

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

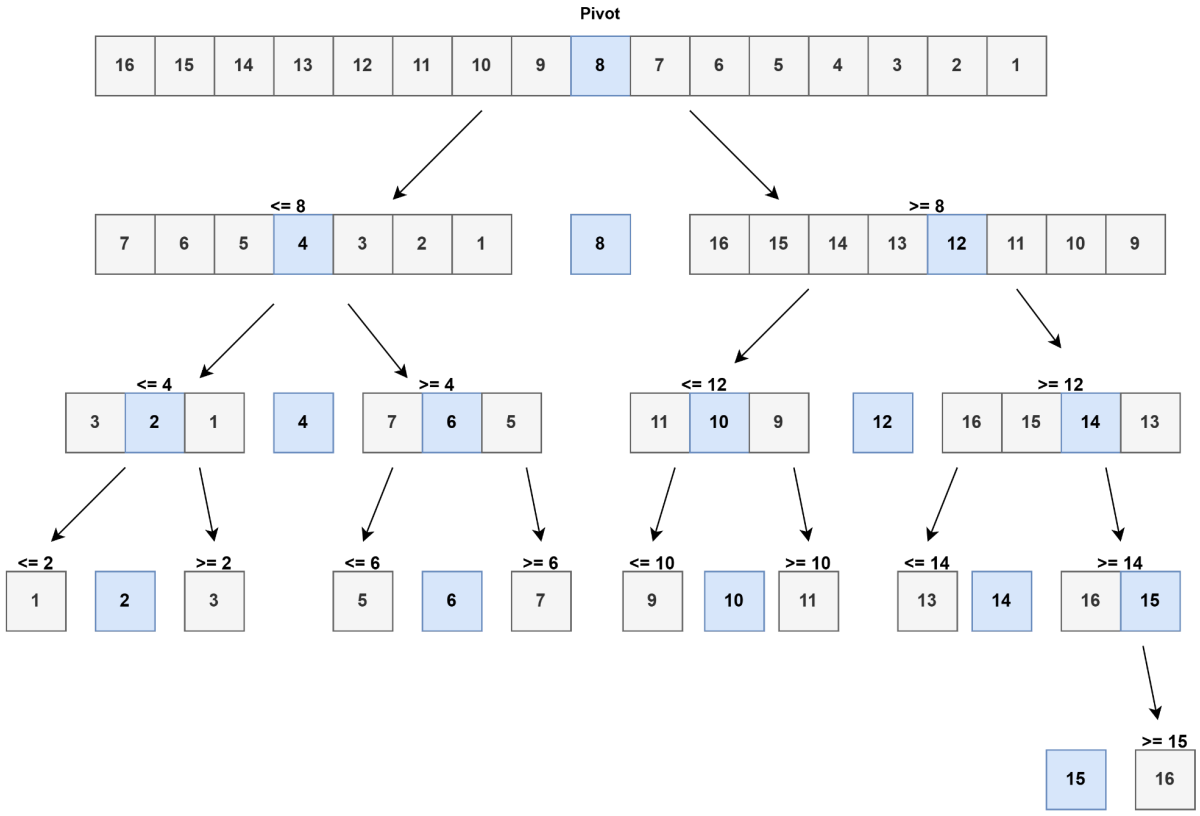
Recursion continued:

$$T(n) = O(1) + \ldots + O(n-1) + O(n)$$

Quicksort in Big-O:

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

2) Quicksort Worst-Case Complexity (Assuming pivot is not in worst case)



4) Both the graph and the worst-case complexity calculations/analysis match as they are both quadratic