

Quick Select Defenition: <https://www.geeksforgeeks.org/quickselect-algorithm/>

Quick Select Algorithm:



## Advanced Algorithms CS403

### Assignment 02



4.5.

```
3. a. Algorithm Quickselect( $A[0..n-1], k$ )
    //Solves the selection problem by partition-based algorithm
    //Input: An array  $A[0..n-1]$  of orderable elements and integer  $k$  ( $1 \leq k \leq n$ )
    //Output: The value of the  $k$ th smallest element in  $A[0..n-1]$ 
     $l \leftarrow 0; \quad r \leftarrow n-1$ 
     $A[n] \leftarrow \infty$  //append sentinel
    while  $l \leq r$  do
         $p \leftarrow A[l]$  //the pivot
         $i \leftarrow l; \quad j \leftarrow r+1$ 
        repeat
            repeat  $i \leftarrow i+1$  until  $A[i] \geq p$ 
            repeat  $j \leftarrow j-1$  until  $A[j] \leq p$  do
                 $\text{swap}(A[i], A[j])$ 
        until  $i \geq j$ 
         $\text{swap}(A[i], A[j])$  //undo last swap
         $\text{swap}(A[l], A[j])$  //partition
        if  $j > k-1$   $r \leftarrow j-1$ 
        else if  $j < k-1$   $l \leftarrow j+1$ 
        else return  $A[k-1]$ 
```

Quick Select Visualization:

[https://www.youtube.com/watch?v=ZAXSFph\\_L-A](https://www.youtube.com/watch?v=ZAXSFph_L-A)

The book: Introduction to the Design and Analysis of Algorithms (3rd ed.) [Levitin 2011-10-09]

Decrease and Conquer:

<https://iq.opengenus.org/decrease-and-conquer/#:~:text=There%20are%20three%20major%20variations,Variable%20size%20decrease>