

k-th Order Selection

Problem: In a list of n values, find the k th smallest.

k changes relative to p and r , so always finding k th smallest value in $A[p, \dots, r]$. (Recursive version.)

```
function selection(A,p,r,k)
  q ← partition(A,p,r)
  if k < q-p+1 then return(selection(A,p,q-1,k))
  else if k > q-p+1 then return(selection(A,q+1,r,k-(q-p+1)))
  else return(q)
end function
```

k stays fixed, so always finding k th smallest value in $A[1, \dots, n]$.

Recursive version.

```
function selection(A,p,r,k)
  q ← partition(A,p,r)
  if k < q then return(selection(A,p,q-1,k))
  else if k > q then return(selection(A,q+1,r,k))
  else return(q)
end function
```

Non-recursive version.

```
function selection(A,k)
  p ← 1; r ← n
  repeat
    q ← partition(A,p,r)
    if k < q then r ← q-1
    else if k > q then p ← q+1
  until k=q
end function
```