Selection

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

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

```
function selection(A,p,r,k)
    s ← approximate_median(A,p,r)
    q ← partition(A,p,r,s)
    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 kth smallest value in $A[1, \ldots, n]$.

Recursive version.

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

Non-recursive version:

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