Randomized Partition

procedure Randomized Partition(A, p, r):
{ Input: A an array of keys, indexed from p to r }
{ Output: A reordered so all keys less than a random pivot
are before that key and all keys greater are after it }
$i \in_R [p, q]$
$x = A[i]$
exchange $A[i]$ and $A[r]$
$i = p - 1$
for $j = p$ **to** $r - 1$
if $A[j] \leq x$
$i++$
exchange $A[i]$ with $A[j]$
exchange $A[i + 1]$ with $A[r]$
return $i + 1$

Randomized Quicksort — from CLRS

procedure Randomized Quicksort(A, p, r):
{ Input: A an array of keys, indexed from p to r }
{ Output: A reordered so all keys from p to r are sorted }
    if $p < r$
        $q =$ Randomized Partition(A, p, r)
        Randomized Quicksort$(A, p, q-1)$:
        Randomized Quicksort$(A, q+1, r)$: