

GREEDY ALGORITHMS + GRAPHS  
(partly ↑  
review)

READING:

CLRS 16.1-16.2, 22.1, 23, 24.1-3

From LAST TIME; deterministic select:

DSELECT(A, k)

let p = GoodPivot(A)

let  $A_L = [a \in A \mid a < p]$

let  $A_R = [a \in A \mid a > p]$

if  $A_L.length + 1 == k$ :

return p X LUCKY case

else if  $A_L.length + 1 < k$ :

return DSELECT( $A_L$ , k)

else:

return DSELECT( $A_R$ ,  $k - A_L.length - 1$ )

GoodPivot(A)

let ~~A5~~ A5 = List of ~~5~~  $\lfloor \frac{A.length}{5} \rfloor$  groups  
of 5 elts plus (perhaps) one "slop" group

let MEDS = [DUMB MEDIAN( $A_i$ ) |  $A_i \in A5$ ]

return DSELECT(MEDS,  $\lfloor \frac{MEDS.length + 1}{2} \rfloor$ )

DUMB MEDIAN(A)

INSERTION SORT(A)

RETURN  $A[\lfloor \frac{A.length + 1}{2} \rfloor]$

# OF ELTS KNOWN < PIVOT

# OF MEDS ≤ PIVOT:  $\geq \frac{1}{2}$  OF MEDS :  $\geq \lfloor \frac{1}{2} \lfloor \frac{n}{5} \rfloor \rfloor$

# OF MEDS =  $\lfloor \frac{n}{5} \rfloor$

# OF GROUPS THAT CONT 3 ELTS < PIVOT:

$\geq \lfloor \frac{1}{2} \lfloor \frac{n}{5} \rfloor \rfloor - 2 \Rightarrow$  # ELT < PIVOT  
 $\geq 3(\lfloor \frac{1}{2} \lfloor \frac{n}{5} \rfloor \rfloor - 2)$

REMINAER: WE STIPULATE  
NO DUPLICATES.

IF THERE ARE DUP VALUES  
 $a_i$  AND  $a_j$ , WHERE  $a_i$   
WAS INITIALLY LEFT OF  
 $a_j$  IN A, THEN WE  
STIPULATE  $a_i < a_j$ .  
(I.E.: TIES BROKEN BY  
LEFTMOST IN ORIGINAL  
ARRAY.)

$|MEDS| = \lfloor \frac{n}{5} \rfloor$