

Obs

# Interval Scheduling Problem

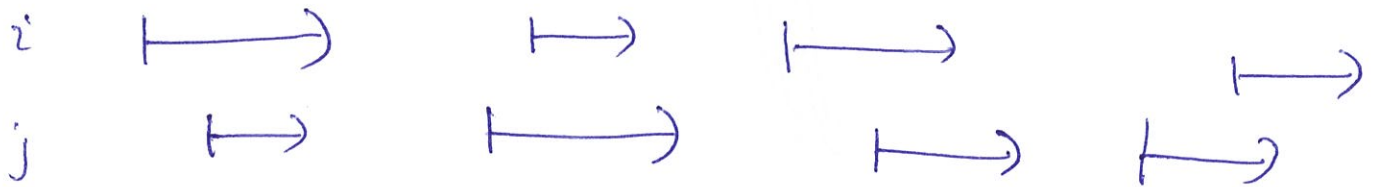
Inputs:  $n$  intervals,  $i^{\text{th}}$  interval  $[s(i), f(i)]$   
start time  $\rightarrow$   $\leftarrow$  finish time

Output: A valid schedule with max # intervals

Def: A schedule  $S \subseteq [n]$  ( $\leftarrow \{1, \dots, n\}$ )

Def: A valid schedule has no conflicts

Def:  $i$  &  $j$  conflict



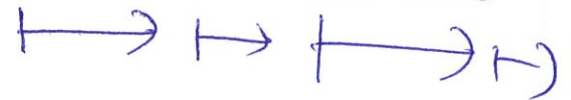
no conflict:



Q) Given  $i$  and  $j$ , how quickly check if  $i$  &  $j$  have a conflict.

\*  $O(1)$  time as have to do  $O(1)$  checks among  $s(i), f(i), s(j), f(j)$

Obs: A valid schedule sorted by start or finish time gives a same order



Assume: Input intervals sorted by finish time  
 $f(1) \leq f(2) \leq \dots \leq f(n)$

## Greedy Algo

0.  $R = [n]$

1.  $S = \emptyset$

2. while  $R \neq \emptyset$

(2.1) let  $i$  be the smallest index in  $R$

(2.2) Add  $i$  to  ~~$R$~~   $S$

(2.3) Delete  $i$  from  $R$

(2.4) Delete all  $j \in R$  that conflict with  $i$

3. Return  $S^* = S$ .