

Exercises from L4 (sorting)

- a) A Majority graph describes in a compact way, all outcomes in pairwise elections between the possible candidates. A majority graph is a directed graph constructed from voter preferences

nodes as outcomes, edges as majority
outcome in pairwise node elections

↳ There is no clear winner here,
no Condorcet winner, all edges
point from an node

c) Since all outcomes have at least one edge pointing from each node, there is no outcome that is not a possible winner.

f) All pairwise elections possible

$$A < B$$

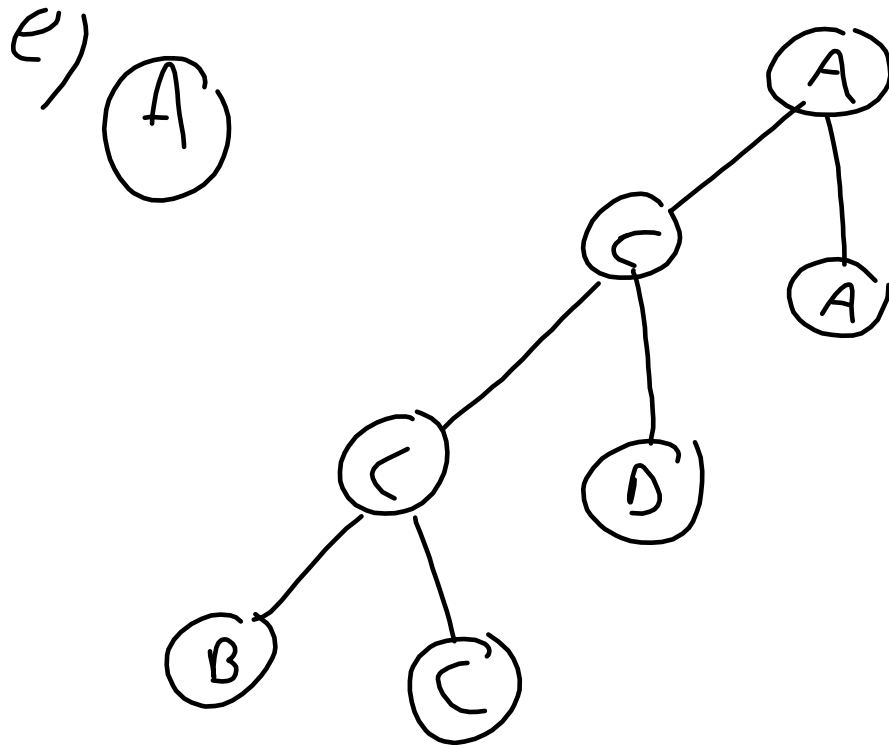
$$B < C$$

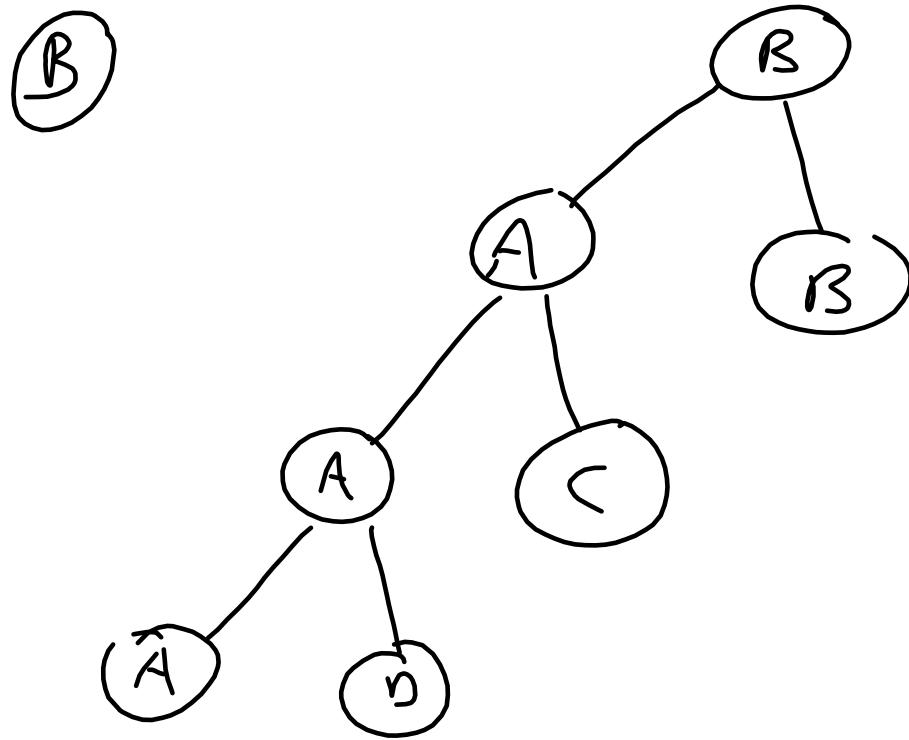
$$C > D$$

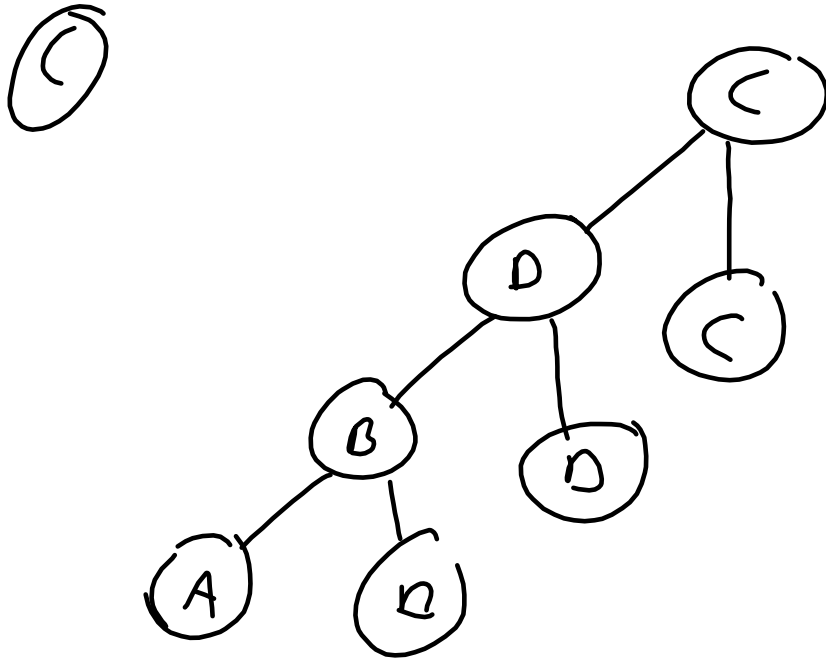
$$A > C$$

$$B < D$$

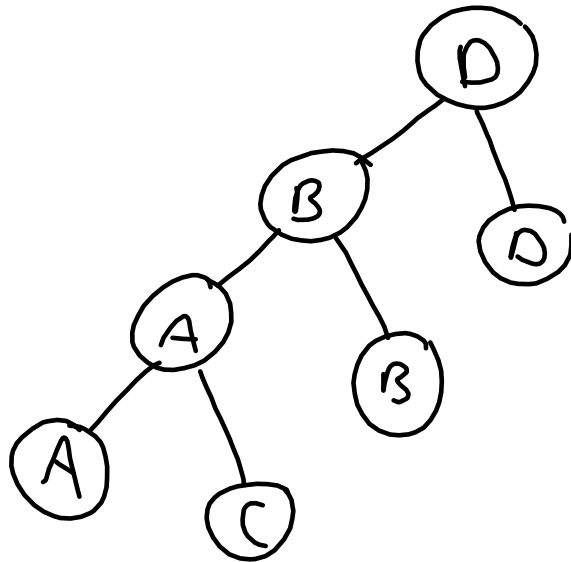
$$A > D$$



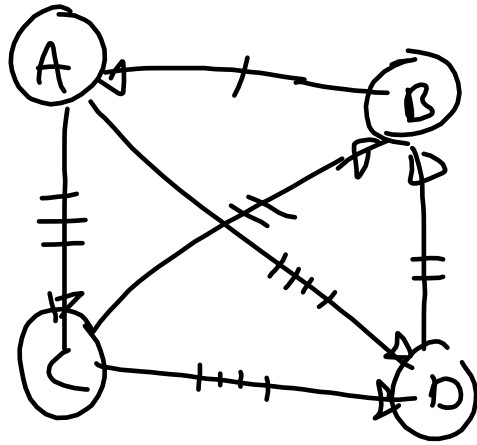




D



f) Condorcet's winner by



(I) A winner one flip

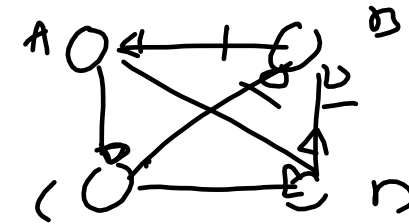
(II) B winner two flips

(III) C winner one flip

(IV) D winner two flips

9) Slater rule: given a particular social order, how many edges must be flipped in the majority by strength in order to produce that social order?

	$A > B > C > D$	3 flips
	$A > B > D > C$	4 flips
	$A > C > B > D$	2 flips
*	$A > C > D > B$	1 flip
	$A > D > B > C$	3 flips
	$A > D > C > B$	2 flips



$(> A > B > D$	3 flips
$(> A > D > B$	2 flips
$(> B > A > D$	2 flips
$(> B > D > A$	3 flips
$(> D > A > B$	3 flips
$(> D > B > A$	2 flips

B's are 2+ flips

D's are 2+ flips

⇒ The state rule/ranking gives
a sequence of

$A > C > D > B$

The state rule is NP-hard