4	2	3
A	C	A
B	B	C
C	A	B

Condorcet Method

(A) vs B — A: 7, B: 2

(A) vs C — A: 7, C: 2

B vs (C) — B: 4, C: 5

A wins!

4	2	3	
A	C	A	2
B	B	C	1
C	A	B	0

A: $4 \cdot 2 + 2 \cdot 0 + 3 \cdot 2$

$8 + 0 + 6 = 14$

B: $4 \cdot 1 + 2 \cdot 1 + 3 \cdot 0 = 6$

$4 + 2 + 0$

C: $4 \cdot 0 + 2 \cdot 2 + 3 \cdot 1 = 7$

$4 + 3$

You try Condorcet & Borda for our class election

Which system is better?

No simple way to compare?

We'll discuss several criteria for judging which are good or bad.

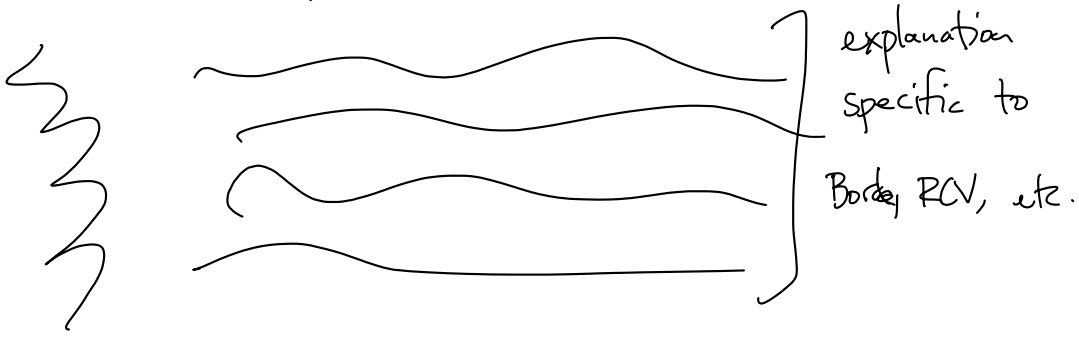
First criterion: (If most of the people agree who's best, they should actually win)

The Majority Criterion If there is a candidate ranked 1st place by a majority, (more than 50%) then that candidate should win.

Which of our systems satisfy this property?

To show a certain system satisfies the Majority, argue like:

Imagine a majority of voters put X in 1st position.



Thus X wins the election

Ex1 Show plurality satisfies the majority criterion.

Imagine X is ranked 1st by a majority of voters.

Then X gets more 1st-place ranks than anybody else.

Thus X wins the election using plurality.

Try Show Condorcet's method satisfies majority criterion

Imagine X gets ranked 1st by a majority of voters

$\Rightarrow$ Then X wins in any 1-on-1 comparison.

Thus X wins using Condorcet's method

How to show something doesn't satisfy majority: Find or invent an example where some cand. is 1st on a majority of ballots, but loses the election.

Borda does not satisfy majority cnt.

3	2	
A	B	2
B	C	1
C	A	0

A is ranked 1st by a majority of voters.

A: $3 \cdot 2 + 2 \cdot 0 = 6$

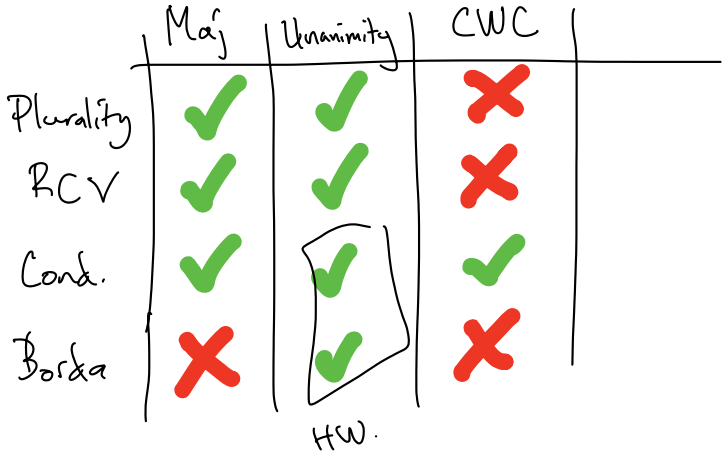
B: $3 \cdot 1 + 2 \cdot 2 = (7)$

C: $3 \cdot 0 + 2 \cdot 1 = 2$

B wins!

A was ranked 1st by a majority, but A last using Borda.

So Borda does not satisfy majority.



Unanimity Criterion

If <u>all</u> voters rank X above Y,

then Y should not win.

(doesn't mean X should win)

<u>Ex</u> Show plurality satisfies unanimity.

Imagine all voters rank X above Y.

Then Y gets 0 1st-place votes.

L

Thus Y doesn't win with plurality.

RCV satisfies unanimity

Assume all voters rank X above Y.

Then Y is eliminated before X.

Then Y does not win using RCV.

Bal 1
X:
Y: 0
Z:

Condorcet Winner Criterion (CWC)

A Condorcet Winner is one who would win in any 1-on-1 comparison.

Def A system satisfies CWC when:

if there is a Cond. winner
then they win the election.

Plurality does not satisfy CWC,
since it is possible for someone to be
Cond. winner, but plurality loser.