

Quiz 1, Math of Democracy

Fall 2019, Dr. Adam Graham-Squire

Name: Key

6:45
→ 25 min.

1. Find the winner of the following election using the Plurality, Instant Runoff, Pairwise Comparison, and Borda count methods. Then use that information to make an argument for which candidate you think most deserves to win the election:

B only has 5 votes who would put them in 3rd/4th place.

Number of voters	3	5	7	6	
1st choice	A	A	B	C	3
2nd choice	B	C	D	B	2
3rd choice	C	B	C	D	1
4th choice	D	D	A	A	0

note: B comes in 2nd place

0.5 Plurality: A wins with 8 votes (But is Cond. loser)

✓ I.R.: D drops, then C, then B wins 13 to 8 over A.

P.C.: B, D, C all beat A 13 to 8

1.5

B vs. C: C beats B, 11 to 10

B vs. D: B beats D 21 to 0

C vs. D: C beats D 14 to 7

C wins with 3 pts,

C is Condorcet winner.

B comes in 2nd place

Borda: A: $9 + 15 + 0 + 0 = 24$

B: $6 + 5 + 21 + 12 = 44 \rightarrow$ B wins

C: $3 + 10 + 7 + 18 = 38$

D: $0 + 0 + 14 + 6 = 20$

Definitely not A b/c Cond. loser and not D b/c everyone prefers B to D.

B wins the Borda Count and IR, but C is the

Condorcet winner... Many answers. I would go with

C b/c of Condorcet winner; ~~but~~ ^{could also} say B b/c they win multiple methods and only barely lose head-to-head with C.

2. Now suppose that in that election, B and D were from the same party. Before the election occurs, D realizes that everyone likes B better and thus D drops out from the race. The preference schedule now looks like:

Number of voters	3	5	7	6	
1st choice	A	A	B	C	2
2nd choice	B	C	C	B	1
3rd choice	C	B	A	A	0

Calculate the winner for the Borda count now. Is there anything disconcerting about the result? If so, what? And does it change your opinion about who should be the winner?

Borda: A: $6 + 10 + 0 + 0 = 16$

B: $3 + 0 + 14 + 6 = 23$

C: $0 + 5 + 7 + 12 = 24 \Rightarrow C$ wins Borda count!

1.5

2.5

Disconcerting? Yes. With D in the race, B wins the Borda count, but w/o D , B loses and C wins. This ~~is~~ is an \checkmark IIA violation because eliminating the losing candidate made a change in the Borda winner. (Note: could also be considered a clone-proof violation b/c D is basically a clone of B since they are in the same party). This makes me feel like C is more of the rightful winner, b/c they are the Condorcet winner, and win Borda w/o D in the race.

-0.5 if student discounts b/c of violation and says B still wins.