

You must **show all work** to receive credit!

9 People were asked to rank their preferences among 4 candidates. Their preferences are shown below. (All questions refer to this preference schedule).

2	3	2	2
a	c	d	d
b	b	b	b
c	a	c	a
d	d	a	c

1. Find the winner using the Borda count.

Assigning 4 points for each 1st place vote, 3 for each 2nd, and so on:

A gets $2*4+5*2+2*1=20$ points

B gets $9*3=27$ points

C gets $4*2+3*4+2*1=22$ points

D gets $5*1+4*4=21$ points

So the winner is **B**

2. Find the winner using the method of head-to-head comparisons.

In a match of A-B: B wins 7-2

A-C: C wins 5-4

A-D: A wins 5-4

B-C: B wins 6-3

B-D: B wins 5-4

C-D: C wins 5-4.

So B wins the most comparisons (in fact, it wins all 3, and so is therefore also a Condorcet candidate).

Note: If you started by looking at B, and noted that it won every comparison so it must be the winner by this method, and then stopped there, that would be acceptable.

3a. Rank the candidates using the extended Plurality method.

D wins with 4 1st place votes, followed by C (with 3), A (with 2), and B (with 0) : **D-C-A-B**

b. Rank the candidates using the recursive Plurality method.

D wins. If D is not present, B would have 4 1st place votes (to 3 for C and 2 for A, again), and so B would win, meaning B comes in 2nd. If neither D nor B were present, C would win with 5 1st place votes to A's 4. So the ranking is **D-B-C-A**

4. a. For **this** preference schedule, did the Borda count violate the Majority criterion? Explain

No. There is no majority candidate, so no outcome for this vote could possibly cause a violation of the Majority criterion.

b. For **this** preference schedule, did the plurality method violate the Condorcet criterion? Explain

Yes. As we saw in #3, there is a Condorcet winner, and it is B. So this criterion claims that the only fair outcome is for B to win. But by the plurality method, the winner was D, so this is a violation of this fairness criterion.