

Voting Theory Test

Show your work and write your answers on a separate sheet.

1. Determine the Condorcet winner in the elections below, or determine if there is no Condorcet winner. (3 each)

a.

Votes	1	1	1	1	1
First	A	B	D	C	A
Second	B	D	C	B	D
Third	C	C	B	A	B
Fourth	D	A	A	D	C

b.

Votes	1	1	1	1	1
First	A	B	D	C	A
Second	C	D	C	B	D
Third	B	C	B	A	B
Fourth	D	A	A	D	C

2. Pre-election polls show that the votes of an upcoming election will be as below. The election will be decided with Borda Count.

Votes	10	6	3	8	7
First	A	B	B	D	C
Second	D	D	A	C	D
Third	B	C	C	B	B
Fourth	C	A	D	A	A

a. Who will win the election as it stands? (3)

b. An interloper E enters the race. E does not rearrange the above polls, he is only inserted into the ballots. Depending on how voters rank E, who has the possibility of winning the election? For each such candidate, provide a final vote with them as the winner

(6)

3. The Hare voting method allows people to vote their minds without worrying about “throwing away” their vote on an unlikely winner. The Hare method successively removes candidate who have the fewest number of first-place votes. The remaining candidates are shifted up to fill any gaps, and the process is repeated. For example, in the ballots

Votes	2	2	1	1	1
First	A	A	B	B	C
Second	B	C	C	A	A
Third	C	B	A	C	B

C is eliminated first, leaving the ballots

Votes	2	2	1	1	1
First	A	A	B	B	A
Second	B	B	A	A	B

where A is the winner. Provide an example of an election where the Hare method and plurality method produce different winners.

(5)

4. In the 1996 West Dakota governor elections, they used Borda Count to determine the governor and vice-governor as the candidates with the most and second-most points. Of the nine candidates, four were Republicans, three were Democrats, and two were Greens. In how many ways could a governor and vice-governor of the same party have been chosen?

(6)