

Math 107, Winter 2007
Aaron Warnock

Ch. 1 Group Project
January 11th, 2007

Names: Key

Complete the following problems. All partners should work together, and all are responsible to make sure that each problem is done correctly. Do not get help from other groups, and you must show your work to get full credit.

Consider the following Preference Schedule for an election.

Voters	22	15	7	4	3
1st	A	B	D	D	C
2nd	E	D	E	C	D
3rd	B	C	C	B	A
4th	D	E	B	A	E
5th	C	A	A	E	B

1. Find the winner of the election using

a) the Plurality method.

A has 22 first place votes.
B has 15 first place votes.
C has 3 first place votes.
D has 11 first place votes.
E has 0 first place votes.

Winner of Plurality is A.

51 total

b) the Borda Count method. (Show totals)

A has 149 points.
B has 130 points.
C has 119 points.
D has 171 points.
E has 156 points.

Winner of Borda Count is D.

$$A - 110 + 15 + 7 + 8 + 9$$

$$B - 66 + 75 + 14 + 12 + 3$$

$$C - 22 + 45 + 21 + 16 + 15$$

$$D - 44 + 60 + 35 + 20 + 12$$

$$E - 86 + 30 + 28 + 4 + 6$$

Voters	22	15	7	4	3
1st	A	B	D	D	C
2nd	E	D	E	C	D
3rd	B	C	C	B	A
4th	D	E	B	A	E
5th	C	A	A	E	B

c) the Plurality-with-Elimination method. Winner of this method is B.

Write the Preference Schedule after round one.

	A	B	C	D	E
R1	22	15	3	11	0
R2	22	15	3	11	X
R3	22	15	X	14	X
R3	25	26	X	X	X

Write the preference schedule after round two.

d) the Pairwise Comparison method.

$A \succ B$ $B \succ C$ $B \succ D$ $D \succ E$
 $A \succ C$ $B \succ D$ $C \succ E$
 $A \succ D$ $B \succ E$
 $A \succ E$

Number of Wins for

A	1
B	3
C	1
D	3
E	2

Winner of P. C. is TIE B or D.

e) Is there a Condorcet candidate for this election? why or why not?
 NO - no candidate could beat everyone head to head.

2. An election is held between 4 candidates (A, B, C, and D) using the Borda count method. There are 35 voters. After the ballots are in and counted A has 83 points, B has 95 points, and C has 79 points. How many points did D receive and who won the election?

(Hint: If there are 4 candidates how many "points" is one ballot worth? How many points is the total voting (35 ballots) worth?)

$10 \times 35 = 350$ pts total

D gets $350 - 83 - 95 - 79 = 93$, but B won.

3. Consider the following preference schedule for president of your organization.

Voters	14	10	8	4	1
1st	C	A	B	D	A
2nd	D	D	A	B	B
3rd	A	B	D	A	D
4th	B	C	C	C	C

~~plurality~~ - C
 Borda - D
~~plurality~~ - HOC
 D
 pairwise - A

a) If you are candidate D what voting method would you choose to ensure your election as President?

D wants Borda.

b) Assume that the candidate who came in second will be named vice-president. If you are candidate C and you do not want the responsibility of being president but would like to be vice-president, which voting method would you choose so that you would be elected to that office?

~~pairwise~~
~~comparative~~
 Work Attached
 plurality w/ elimination
 Borda (last)
 *plurality (2nd)
 pair. (last)

4. Describe the difference between extended ranking and recursive ranking.

For recursive, winners are removed & the counting begins again. However, extended methods just compare the results of the original counts.

	14	10	8	4	1
1st	C	A	B	D	A
2nd	D	D	A	B	B
3rd	A	B	D	A	D
4th	B	C	C	C	C

Plurality

$C \rightarrow A \rightarrow B \rightarrow D$

Borda

$D \rightarrow A \rightarrow B \rightarrow C$

$A - 28 + 40 + 24 + 8 + 4 = 104$

$B - 14 + 20 + 32 + 12 + 3 = 81$

$C - 56 + 10 + 8 + 4 + 1 = 79$

$D - 42 + 30 + 16 + 26 + 2 = 116$

Plurality w/elim

	A	B	C	D
R1	9	8	14	4
R2	11	12	14	X
R3	X	23	14	X

$B \rightarrow C \rightarrow A \rightarrow D$

Pairwise

$A \checkmark B$

$B \checkmark C$

$C \checkmark D$

$A \checkmark C$

$B \checkmark D$

$A \checkmark D$

$A \rightarrow D \rightarrow B \rightarrow C$