

Worksheet #3
August 27, 2018
3 Points

Circle one name.

Name: Solutions Name: _____ Name: _____

A committee of twenty people is trying to decide which of four departments is going to get funding. The four departments are Art (A), English (E), History (H), and Political Science (P). Their preference ballots look as follows:

1	1	2	1	1	2	2	3	4	3	2	3	3	4	4	6	7	4	4	5
A	P	A	E	P	E	P	A	A	E	P	P	P	E	E	E	E	P	P	A
H	A	H	A	E	A	A	H	H	A	E	E	A	A	A	A	A	E	A	H
E	E	E	P	A	P	E	E	E	P	A	A	E	P	P	P	P	A	H	E
P	H	P	H	H	H	H	P	P	H	H	H	H	H	H	H	H	H	E	P

1. Create a preference schedule based on the above ballots

# of voters	5	4 3	7	4	1	
1st	A	P	E	P	P	
2nd	H	A	A	E	A	
3rd	E	E	P	A	H	
4th	P	H	H	H	E	

2. Using the Plurality Method, which choice wins?

P because P is the first-place vote on 8 ballots,
 $\overbrace{3+4+1}^8$
 which is more than A, E, or H. (5, 7, and 0, respectively)

3. Who is the winner using the Borda Count Method? (Show the computations to calculate Borda points for each department.) *Calculations are column-by-column*

$$A: 5(4) + 3(3) + 7(3) + 4(2) + 1(3) = 61$$

$$E: 5(2) + 3(2) + 7(4) + 4(3) + 1(1) = 57$$

$$H: 5(3) + 3(1) + 7(1) + 4(1) + 1(2) = 31$$

$$P: 5(1) + 3(4) + 7(2) + 4(4) + 1(4) = 51$$

4 votes for 1st place
3 votes for 2nd place
2 votes for 3rd place
1 vote for 4th place

A wins using Borda

4. Who is the winner using Plurality with Elimination (also called "instant runoff voting")? (show steps clearly!)

5 3 7 4 1
A P E P P
H A A E A
E E P A H
P A H H E

Eliminate H.
H has the fewest
1st place votes.

→ 5 3 7 4 1
A P E P P
E A A E A
P E P A E

No majority,
eliminate A.
A has the fewest
1st place votes.

→ 5 3 7 4 1
E P E P P
P E P E E

E has over 50%
of the votes

20 total voters
 $20 + 1 = 21$
 $\frac{21}{2} = 10.5$
 $10.5 \rightarrow 11$
must have 11 or more
votes to be majority

E wins using Plurality with Elimination