

Name: \_\_\_\_\_ score: \_\_\_\_\_ / 10

There are 10 points possible on this quiz. No aids (book, notes, etc.) are permitted. You may use a calculator. **Show all work and supporting calculations for full credit. Explain how you get your answers.**

1. (5 points) The student government is holding elections for president. There are four candidates (A,B,C and D for convenience). The preference schedule is below.

number of voters	7	6	5	11	13
1st choice	C	<del>B</del>	C	<del>D</del>	A
2nd choice	<del>D</del>	A	A	<del>B</del>	C
3rd choice	<del>B</del>	<del>D</del>	<del>B</del>	C	<del>B</del>
4th choice	A	C	<del>D</del>	A	<del>D</del>

$$\rightarrow \# \text{ votes} = 7 + 6 + 5 + 11 + 13 = 42$$

(a) How many voters participated? 42

(b) Does any candidate win a **majority**? **Justify** your answer.

No. A majority would require  $21 + 1 = 22$  votes.

The tally is: A : 13  
B : 6  
C :  $7 + 5 = 12$   
D : 11

No one got 22.

(c) Find the winner under the Instant Runoff Voting / Ranked Choice Voting method. For each round, state the vote tally and identify the candidate eliminated.

Round 0 : A : 13  
B : 6  
C : 12  
D : 11

No majority. B is eliminated

Round 1 : A :  $6 + 13 = 19$   
C :  $7 + 5 = 12$   
D : 11

No majority. D is eliminated

Round 2 : A :  $6 + 13 = 19$   
C :  $7 + 5 + 11 = \underline{\underline{23}}$

C wins

2. (5 points) Below is the same preference schedule.

points	number of voters	30	10	10	5
4	1st choice	C	B	D	D
3	2nd choice	D	D	A	B
2	3rd choice	B	A	B	A
1	4th choice	A	C	C	C

$$30 + 10 + 10 + 5$$

(a) How many voters participated? 55

(b) Find the winner under the Borda Count Method. (Show your calculations to earn full credit.)

$$\begin{aligned}
 A &: 30(1) + 10(2) + 10(3) + 5(2) = 90 \\
 B &: 30(2) + 10(4) + 10(2) + 5(3) = 135 \\
 C &: 30(4) + 10(1) + 10(1) + 5(1) = 145 \\
 D &: 30(3) + 10(3) + 10(4) + 5(4) = 180
 \end{aligned}$$

D wins

(c) Which fairness criteria is violated in this case?

The majority criterion.

$55/2 = 27.5$  and  $30 > 27.5$ , so C had a majority of the votes, but C did not win the election under Borda Count.