Voting Systems

Assignment 6, Due March 9, 5pm

In each of the following sets of questions, there is an election between four candidates A, B, C and D. The question sets start with a table showing how many voters have each of the 24 possible preference orderings over the four candidates. Your job is to figure out how the election would go under different voting systems. You should assume (unrealistically) that every voter votes sincerely, and not strategically. So if a candidate prefers A to B to C to D, they will vote A in a plurality election, vote B if it is two candidate run off between B and C, and write down the order ABCD if they are asked to rank the candidates.

In the tables that follow, higher ranked candidates are to the left. So the first row of the table shows you the number of voters (339 as it turns out) who have A as their top choice, then B as their second choice, then C, and finally D as the last choice.

Questions 1 to 2

Here is the table of voters.

Ranking	Voters
ABCD	339
ABDC	710
ACBD	312
ACDB	798
ADBC	151
ADCB	592
BACD	956
BADC	243
BCAD	939
BCDA	114
BDAC	984
BDCA	632
CABD	598
CADB	902
CBAD	574
CBDA	245
CDAB	860
CDBA	74
DABC	438
DACB	759
DBAC	245
DBCA	378
DCAB	397
DCBA	526

1. Who would win the election if was run as a plurality election?
2. Who would win the election if there was a runoff, with the top 2 candidates advancing to the runoff?

Questions 3 to 5

Here is the table of voters

Ranking	Voters
ABCD	704
ABDC	169
ACBD	773
ACDB	401
ADBC	879
ADCB	299
BACD	667
BADC	121
BCAD	769
BCDA	725
BDAC	346
BDCA	456
CABD	900
CADB	184
CBAD	668
CBDA	647
CDAB	103
CDBA	493
DABC	240
DACB	687
DBAC	968
DBCA	194
DCAB	498
DCBA	79

3. Who would win the election if was run as a plurality election?
4. Who would win the election if there was a runoff, with the top 2 candidates advancing to the runoff?
5. Imagine that it was still being run as a runoff, but some number of A's voters changed their mind and voted for some other candidate. Find the smallest number of such voters that are sufficient to make A *win* the election.

Questions 6 to 10

Here is the table of voters

Ranking	Voters
ABCD	10
ABDC	61
ACBD	46
ACDB	25
ADBC	54
ADCB	62
BACD	74
BADC	73
BCAD	45
BCDA	14
BDAC	66
BDCA	73
CABD	34
CADB	98
CBAD	87
CBDA	15
CDAB	14
CDBA	65
DABC	90
DACB	23
DBAC	67
DBCA	1
DCAB	22
DCBA	36

6. Imagine that the election is being run using the Borda score. The candidate with the highest Borda score will win. Who wins the election?
7. Imagine that candidate A drops out, so there are just three candidates remaining, but no voter changes their view about the relative ranking of the other candidates. Who wins the election now?
8. Imagine that candidate B drops out, so there are just three candidates remaining, but no voter changes their view about the relative ranking of the other candidates. Who wins the election now?
9. Imagine that candidate C drops out, so there are just three candidates remaining, but no voter changes their view about the relative ranking of the other candidates. Who wins the election now?
10. Imagine that candidate D drops out, so there are just three candidates remaining, but no voter changes their view about the relative ranking of the other candidates. Who wins the election now?

Other Stuff

I've posted the data for the questions in an Excel file on the Canvas page as 444-assignment-6-data.xlsx. That will save you having to transcribe, or copy and paste, from the tables here.

And as with last week's assignment, I'll include an ungraded question where you can upload your work. Everyone must upload something to show their workings. If you don't get full marks for a question, these will be used to assess partial credit.