

USE A SEPARATE SHEET OF PAPER TO SHOW YOUR WORK THAT JUSTIFIES YOUR ANSWERS FOR EACH OF THE FOLLOWING QUESTIONS.

- 1) The Justice League is voting on its new team leader. The candidates for team leader are (S)uperman, (B)atman, (G)reen Lantern, and (F)lash. The results of each individual ballot can be found in the table below:

Justice League Election Results									
1	S, B, G, F	9	G, B, S, F	17	G, B, S, F	25	S, F, G, B	33	B, G, S, F
2	B, G, S, F	10	G, F, S, B	18	S, B, G, F	26	S, B, G, F	34	G, F, S, B
3	F, G, B, S	11	S, B, G, F	19	S, F, G, B	27	S, B, G, F	35	G, B, S, F
4	S, B, G, F	12	G, B, S, F	20	S, B, G, F	28	G, F, S, B	36	G, B, S, F
5	B, G, S, F	13	B, G, S, F	21	B, G, S, F	29	F, G, B, S	37	B, G, S, F
6	S, F, G, B	14	G, B, S, F	22	F, G, B, S	30	B, G, S, F	38	F, G, B, S
7	S, F, G, B	15	S, B, G, F	23	S, F, G, B	31	S, B, G, F	39	S, B, G, F
8	F, G, B, S	16	F, G, B, S	24	G, B, S, F	32	G, B, S, F	40	B, G, S, F

First, create a preference table using the preference ballots. Then determine a winner by applying the following methods:

- a) Plurality
  - b) Plurality with Elimination
  - c) Borda Count
  - d) Run-off
  - e) Approval (use the first 2 preferences as votes of approval)
- 2) Suppose that an election has candidates A, B, C and D. There are 46 voters who submit the following ranked ballots.

12	5	4	9	6	10
C	B	D	A	A	D
D	C	A	C	D	B
B	A	B	B	C	A
A	D	C	D	B	C

Find the winner (or winners), if there are any winners, by each of the following methods. If a method fails, explain why:

- (a) Plurality
- (b) Plurality with Elimination
- (c) Runoff
- (d) Borda count
- (e) Approval (assume the top 2 rankings are approval votes)

- 3) Suppose that an election has candidates A, B, C, D and E. There are 7 voters, who submit the following ranked ballots.

2	1	1	1	1	1
C	D	C	B	E	D
A	A	E	D	D	A
E	E	D	A	A	E
B	C	A	E	C	B
D	B	B	C	B	C

Find the winner (or winners), if there are any winners, by each of the following methods. If a method fails, explain why:

- Plurality
  - Plurality with Elimination
  - Runoff
  - Borda count
  - Approval (assume the top 2 rankings are approval votes)
- 4) Suppose that an election has candidates A, B, C and D. There are 35 voters, who submit the following Approval Voting ballots. Find the winner using Approval Voting.

Candidate	8	7	6	3	4	2	5
A	X	X			X		X
B	X		X	X			X
C		X	X	X		X	
D	X		X		X	X	

- 5) A city council election is held. There are three candidates: Don, Key, and Elle. A preference schedule for the votes is given. Determine the winner using:

- Plurality
- Condorcet's method

	342	214	298
1 <sup>st</sup> choice	Elle	Don	Key
2 <sup>nd</sup> choice	Don	Key	Don
3 <sup>rd</sup> choice	Key	Elle	Elle

- 6) Consider the preference schedule below, in which a company's advertising team is voting on five different advertising slogans, called A, B, C, D, and E. Determine the winner using:

- Plurality
- Pairwise voting

	3	4	4	6	2	1
1 <sup>st</sup> choice	B	C	B	D	B	E
2 <sup>nd</sup> choice	C	A	D	C	E	A
3 <sup>rd</sup> choice	A	D	C	A	A	D
4 <sup>th</sup> choice	D	B	A	E	C	B
5 <sup>th</sup> choice	E	E	E	B	D	C