## 1.14 More Exercises

- **1.** (a) Consider the preference rankings for the 1992 U.S. Presidential Election election below. Is there a Condorcet winner? Explain.
  - (b) Is this an example of a Condorcet paradox? Explain.

	36 Voters	8 Voters	30 Voters	9 Voters	7 Voters	13 Voters
Clinton	1	1	3	2	2	3
Bush	3	2	1	1	3	2
Perot	2	3	2	3	1	1

- 2. Suppose that we transform the data above into the following range voting data.
  - (a) Who is the range vote winner?
  - (b) Does this particular example of range voting violate the Condorcet criterion? Explain.
  - (c) Does this particular example of range voting violate the Majority criterion? Explain.

	36 Voters	8 Voters	30 Voters	9 Voters	7 Voters	13 Voters
Clinton	5	5	2	4	4	2
Bush	1	3	5	5	1	3
Perot	2	1	4	2	5	5

**3.** Tasmania State University marching band has been invited to march in 5 different parades: the Rose Bowl parade, the Hula Bowl parade, the Cotton Bowl parade, the Orange Bowl parade, and the Sugar Bowl parade. The band director decides to use Approval Voting to determine which parade to attend. The assistant in charge of polling the 100 band members misunderstood the instructions and asked each band member to rank the parades from 1st choice to 5th choice and summarized the results in the following preference schedule. The band director now has to decide what to do with this information since it wasnt exactly what he needed.

	36 Voters	16 Voters	45 Voters
Rose	1	5	5
Hula	2	1	2
Cotton	3	4	1
Orange	4	3	4
Sugar	5	2	3

- (a) Suppose the band director decides to change methods and choose the parade using plurality with instant runoff. Which parade will be chosen?
- (b) Suppose the band director decides to change methods and choose the parade using pairwise comparisons. Is there a Condorcet winner? Loser? (Once you find them you can stop.)
- (c) Suppose the band director decides to change methods and choose the parade using Borda Count. Which parade will be chosen?
- (d) Suppose the band director decides to try Approval Voting anyway. Which parade is chosen if, after re-polling, each band member approved only his/her first, second, and third choices?
- (e) Suppose the band director decides to try Approval Voting anyway. Which parade is chosen if, after re-polling, each band member approved only his/her first and second choices?
- (f) Suppose the band director decides to try Approval Voting anyway. Which parade is chosen if, after re-polling, each band member whose first choice was the Cotton Bowl approved only of the Cotton Bowl but everyone else approved of his/her first three choices?

**4.** (a) [From class on Thursday. Do this in your journal.] For this exercise, suppose that a range ballot is used to determine select color, where each voter rates each candidate on a scale of 1 to 5, where 1 is the worst rating and 5 is the best. Here are the results when the ballots are tabulated. Who is the range vote winner? **Show your work.** 

	6 Voters	3 Voters	5 Voters	5 Voters	7 Voters	3 Voters	Range Total
Red	3	5	5	1	1	2	
Green	5	4	3	4	3	1	
Blue	2	1	1	5	5	5	

(b) Let's assume that if a voter were asked to rank the candidates (first choice, second choice, third choice), then the voter's ranking would reflect their ratings of the candidates. For example, a voter who rated Red 3 out 5, Green 5 out of 5, and Blue 2 out of 5 would have Green as first choice, Red as second choice, and Blue as third choice. Create a table for voters' individual rankings based on part (a).

	6 Voters	3 Voters	5 Voters	5 Voters	7 Voters	3 Voters	Plurality	Borda Count
Red Green Blue								

- (c) Given the table of rankings in part (b), would one of the candidates would win a plurality election with an actual majority? If so, which one? Why?
- (d) Based on the table of rankings in part (b), which candidate, if any, would be the winner under the Condorcet voting method? Why?
- (e) Based on the table of rankings in part (b), which candidate would be the winner under the Borda Count voting method? Show your work.
- (f) Which voting methods in this problem, if any, violated the Majority criterion?
- (g) Which voting methods in this problem, if any, violated the Condorcet criterion?