Worksheet 2

Mathematics of Social Choice
Duchin, Spring 2021

Problem 1. Come up with a preference schedule that has a Condorcet candidate but whose pairwise comparison graph contains a Condorcet cycle. (Start with a graph but be sure you build a corresponding preference schedule.)

Problem 2. Explain why no election can have more than one Condorcet candidate. Explain why a majority candidate is always a Condorcet candidate.

Problem 3. Which of these fairness criteria implies the other? First mark each implication as true or false. Then make a Venn diagram with bubbles for all three of these fairness conditions.

1. Condorcet-fair $\stackrel{?}{\Longrightarrow}$ majority-fair
2. Unanimity-fair $\stackrel{?}{\Longrightarrow}$ majority fair
3. Majority-fair $\stackrel{?}{\Longrightarrow}$ unanimity-fair

Problem 4. Explain why Borda count satisfies the unanimity criterion.