Math of Elections #2

Plurality Method

Definitions

- A **majority candidate** is one who wins *more than half* of the first place votes in an election.
- A **Condorcet candidate** is one who beats every other candiate in a one-on-one election.
- A **plurality candidate** is one who wins *the most* first place votes in an election.
- The **Plurality Method** for elections works as follows. Candidates are ranked according to the number of first place votes they received: the one with the most is ranked first, the one with the second most is ranked second, and so on. The winner with this method is the plurality candidate.

Exercise

We saw the preference ballots for a club election in Handout 01. A **preference schedule** summarizes the ballots by counting those that are the same. Here's the preference schedule for the Club Election Example.

Number of Voters	**14**	**10**	**8**	**4**	**1**
1st	C	L	N	E	L
2nd	E	E	L	N	N
3rd	L	N	E	L	E
4th	N	C	C	C	C

1. Show that this election does *not* have a majority candidate.

2. Show that this election does have a Condorcet candidate. Who is it?

3. Who is the plurality candidate for this election? What percent of the first place vote did they receive?

4. Use the plurality method to rank all of the candidates.

Exercise

Suppose there is an election with 4 candidates and 60 voters.

1. What is the least number of votes a candidate could get and still be a majority candidate?

2. What is the least number of votes a candidate could get and still be a plurality candidate?

Exercise

Go back to the Club Election Example, and suppose Nguyen dropped out of the election. Write out a new **preference schedule**, and find the new plurality candidate. Does this seem like an issue? Why?

Exercise

Suppose that there is an election with 9 voters and 3 candidates: Amber (A), Bernard (B), and Crystal (C). Find a way to fill in the 9 ballots so that Amber is the Condorcet candidate but Bernard wins by the plurality method. Does this seem like an issue? Why?

Ranking	**Ballot**	**Ballot**	**Ballot**	**Ballot**	**Ballot**	**Ballot**	**Ballot**	**Ballot**	**Ballot**
1st									
2nd									
3rd									

> The following two criterion seem desirable for a voting method, but we saw that the plurality method might violate either one.
>
> - The **Independence of Irrelevant Alternatives (IIA) criterion** states: if a candidate would win, they would still win if any of the other candidates were removed. A method that fails this can have *spoilers*: a losing candidate who draw votes away from another candidate who could have won.
> - The **Condorcet criterion** states: if there is a Condorcet candidate, they should be the winner.