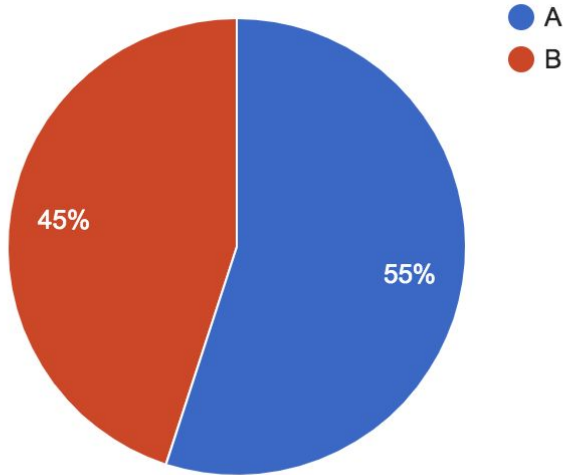# Voting Methods: Why They Matter

Minerva Johar
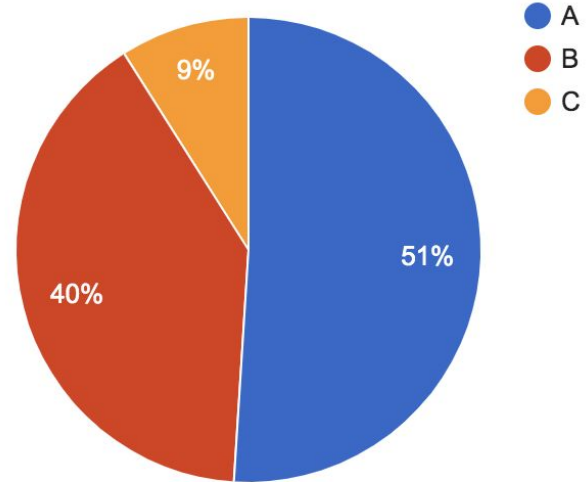
The Institute for Mathematics and Democracy
Nov. 3, 2020

Majority Vote
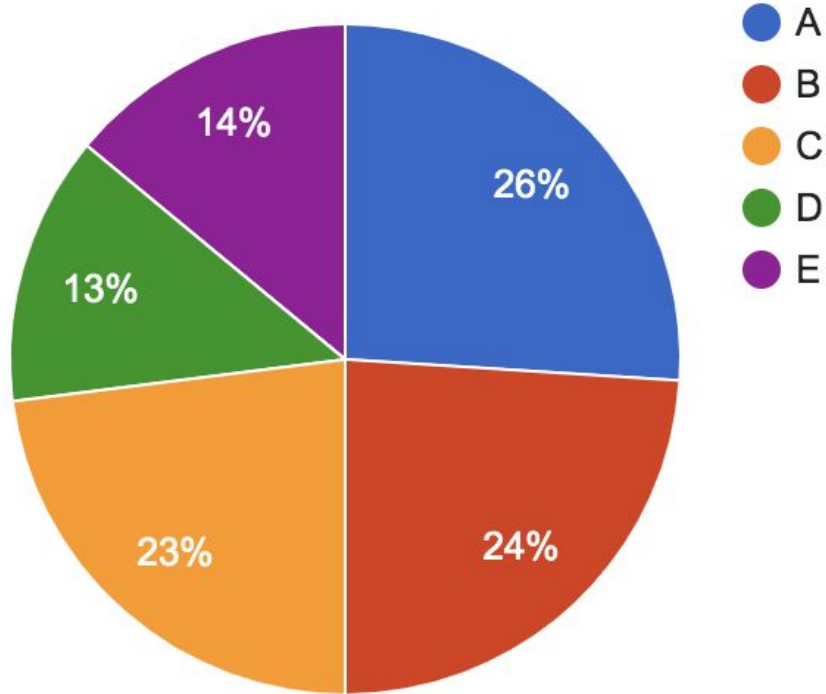

- ❏ Two candidates
- ❏ A wins

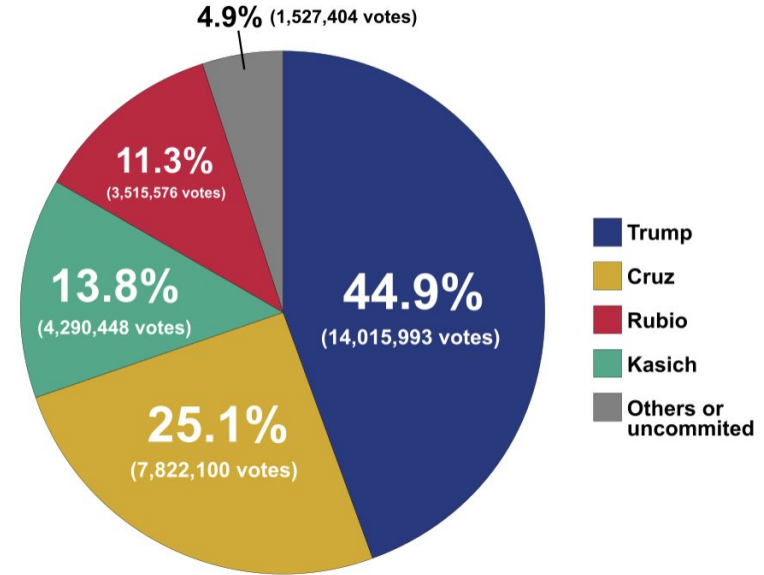- ❏ Three candidates
- ❏ A still wins

Plurality Vote

- ❏ There is no majority winner
- ❏ A has the most votes, so A wins
- ❏ But 74% of voters didn't have A as their first choice

Problem: Vote Splitting

- Trump won a plurality of the popular vote
- Polls indicate that voters preferred Rubio or Cruz over Trump in one-on-one contests

2016 Republican Party presidential primaries popular vote

4.9% (1,527,404 votes)

11.3% (3,515,576 votes)

13.8% (4,290,448 votes)

44.9% (14,015,993 votes)

25.1% (7,822,100 votes)

- Trump
- Cruz
- Rubio
- Kasich
- Others or uncommitted

Another Example

Candidate	Party	Votes	Pct.
✓ Paul LePage	Rep.	218,065	38.2%
Eliot Cutler	Ind.	208,270	36.5%
Libby Mitchell	Dem.	109,387	19.2%
Shawn Moody	Ind.	28,756	5.0%
Kevin Scott	Ind.	5,664	1.0%

2010 Maine Gubernatorial Elections

Ranked Choice Voting

Ranked Choice Voting

20	18	10	2
A	D	B	A
B	B	C	C
D	C	D	D
C	A	A	B

- ❏ Voters rank candidates in order of preference
- ❏ A has the most first place votes at 22, so A wins the plurality vote.
- ❏ Need 25 to be a majority winner
- ❏ How to decide the winner?
  - ❏ Instant runoff
  - ❏ Borda count
  - ❏ Many other methods

Ranked Choice Voting - Instant Runoff

❏ Eliminate candidates by removing the one with the fewest first place votes
❏ Repeat the process until there is a majority winner

20	18	10	2
A	D	B	A
B	B	C	C
D	C	D	D
C	A	A	B

➡

20	18	10	2
A	D	B	A
B	B	D	D
D	A	A	B

➡

20	18	10	2
A	D	D	A
D	A	A	D

❏ A was the plurality winner, but D wins the instant runoff

Ranked Choice Voting - Borda count

❏ Have each ranking of a candidate be worth a certain number of points - with n candidates, first place is worth n-1 points, second is worth n-2 points, and so on
❏ In this case (four candidates), first place is worth 3 points, second is worth 2, third is worth 1, and last is worth 0.

20	18	10	2
A	D	B	A
B	B	C	C
D	C	D	D
C	A	A	B

❏ A's score: 20*3 + 18*0 + 10*0 + 2*3 = 66
❏ B's score: 20*2 + 18*2 + 10*3 + 2*0 = 106
❏ C's score: 20*0 + 18*1 + 10*2 + 2*2 = 42
❏ D's score: 20*1 + 18*3 + 10*1 + 2*1 = 86

❏ B is the Borda count winner.

Results of Different Voting Methods

20	18	10	2
A	D	B	A
B	B	C	C
D	C	D	D
C	A	A	B

- ❏ No majority winner
- ❏ A is the plurality winner
- ❏ D is the instant runoff winner
- ❏ B is the Borda count winner
- ❏ Who should be the real winner?

What Makes a Good Voting System?

Majority Rule

❏ A voting system should try to be consistent with the principle of majority rule
❏ How do the voting systems we've discussed deal with this?
   ❏ **Plurality voting** seems like a simple extension of majority voting, but does not adequately capture voter preferences.
   ❏ **Borda count** does not take majority rule into account
   ❏ **Instant runoff** is built with the goal of producing a majority winner
❏ Though there are many ways to implement ranked choice voting, instant runoff is appealing because reflects the idea of majority rule

More Properties for a Good Voting System

❏ Some Definitions:
  ❏ **Pareto Criterion:** If everyone prefers candidate A to candidate B, candidate B cannot win.
  ❏ **Independence of Irrelevant Alternatives (IIA):** If the voters as a group prefer A to B, and some voters change the rankings of other candidates but leave A and B alone, it should not change the relative ranking of A and B.
❏ **Arrow's Impossibility Theorem**: Any ranked choice voting system that satisfies the Pareto Criterion and IIA is a dictatorship.
❏ Does this mean ranked choice voting is bad?

Final Takeaways

❏ Plurality voting: Easy to understand, but does not adequately represent voter preferences
❏ Ranked choice voting offers more freedom to voters and better reflects group preferences
❏ Though we currently use plurality voting, change is possible!
    ❏ Ranked choice voting is **on the ballot today** in Massachusetts and Alaska!
    ❏ Already used in Maine on a statewide level, and in many cities across the country.

Thank you!