

CS-234

# Technologies for societal self-organization

Week 5

# Election methods - desirable properties

- Equality - "one person one vote"
- Majority rule: if majority ( $> 50\%$ ) of voters want X, chooses X.
- Proportionality: "as representative as possible"
- Inclusiveness: about eligibility, registration accessibility, ...
- Participation / turnout: raise questions about legitimacy, ...
- Tyranny of the majority: processes, deliberation, courts, ...
- Universality: always come to some decision, always a winner
- <sup>fias</sup> Determinism: for given set of votes, always yields same choice
- Condorcet consistency: if A would win pairwise against others, then choice must be A.  
(can be cycles)
- Non-manipulability: reveal true preference not vote strategically  
true preference might be candidate who "can't win"
- Monotonicity: adding vote for X shouldn't hurt X

# Single-winner methods

- Plurality: pick 1 of  $k$  candidates  
candidate with most votes wins
  - Spoiler effect: incentivizes strategic voting for "moderate" (2-party) candidate
- Approval: pick any subset of  $k$  candidates  
candidate with most votes wins
  - Eliminates spoiler effect: can vote for both/all
  - Centrism: help moderate candidates over extremist

left — center — right  
A B C

3  
A  
B

2  
B  
A

4  
C  
B

- plurality: C

- Instant runoff: A

- Approval: B

# Multi-winner election methods

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District representation - single-winner election per district

- Gerrymandering - representatives choose voters

- Non-representative: spread-out minorities under-represented

Proportional representation (PR): if  $x\%$  of voters support  $P$   
 $\approx x\%$  of seats go to  $P$

- Party-list PR: vote for party, party gets # of seats

  - customizable lists

- STV: single transferable votes

  - loop: count 1st-choice votes

    - if highest  $>$  threshold/quota, elect
    - transfer "extra" votes over quota

    - else eliminate lowest candidate

    - transfer all votes to next pref.

Quotas: Have  $(n/k)$  drop quota  $(n(k+1)+1) \dots$