Discrete Math: 1.2 The Plurality Method   Name: *Key*
Date: Period:

Plurality Method: Counts 1st place votes only

Plurality Candidate: Candidate with the most 1st place votes

Majority Candidate: Candidate with a majority (more than $\frac{1}{2}$) of 1st place votes

Condorcet Candidate: Candidate preferred by a majority of the voters over every other candidate when candidates are compared head to head

Insincere Voting: Knowing my candidate won't win, so I cast my vote on a loser, more likely to win candidate so as not to "waste my vote"

Strategic Voting: Same ↗

The student body at a high school is having an election for Homcoming Queen. The candidates are Alicia, Brandy, Cleo, and Dionne (A, B, C, and D for short). The following table gives the preference schedule for the election.

Number of Voters	158	117	40	216	115	29	197	163	187	122
1st choice	A	A	A	B	B	B	C	C	D	D
2nd choice	C	B	D	D	C	C	A	B	A	B
3rd choice	B	D	C	A	D	A	D	A	C	C
4th choice	D	C	B	C	A	D	B	D	B	A

1. Use the plurality method to find the winner(s) of the election.

   A- 315   (C- 360)

   (B- 360)   D-309   B + C tie.

2. One tie-breaking rule says that if there is more than one alternative with a plurality of the first-place votes, then the tie is broken by choosing the alternative with the fewest last-place votes. Who would be the Homecoming Queen under this tie-breaking rule?

   last place: B - 424

   C - 333   C wins

3. A different tie-breaking rule says that if there are two candidates tied with a plurality of the first-place votes, the tie is broken by a head-to-head comparison between the two candidates. Who would be the Homecoming Queen under this tie-breaking rule?

   B - 117 + 216 + 115 + 29 + 122 = 599

   C - 158 + 40 + 197 + 163 + 187 = 745   C

An election with four candidates (A, B, C, D) and 200 voters is to be decided using the plurality method. After 150 votes have been recorded, A has 34 votes, B has 22 votes, C has 51 votes, and D has 39 votes.

4. For A to win the election outright, at least how many of the remaining votes need to have A in first place?

    18

5. For B to win the election outright, at least how many of the remaining votes need to have B in first place?

    30

6. For C to win the election outright, at least how many of the remaining votes need to have C in first place?

    0

7. For D to win the election outright, at least how many of the remaining votes need to have D in first place?

    13

Consider an election with 441 voters.

8. If there are 4 candidates, at least x votes are needed to have a plurality of the votes. Find x.

    $$\frac{441}{4} = 110.25 \qquad 111$$

9. Suppose that at least 45 votes are needed to have a plurality of the votes. What is the number of candidates in the election?

    10

10. Suppose that at least 41 votes are needed to have a plurality of the votes. What is the number of candidates in the election?

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