Homework:

1. Given the following situation, decide which voting method you would use and describe your reason.
	1. Selecting candidates for homecoming court
	2. Electing a student body president

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* 1. Determining which 3 varieties of soda to offer at prom from a list of 10.
1. Explain which voting types are used in electing the United States President. Describe beginning with the general election.
2. If this is the data, who would win for each voting method? If there is a tie simply state so.

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| --- | --- | --- | --- |
| Person | Chocolate | Vanilla | Strawberry |
| A | 1 | 3 | 2 |
| B | 2 | 1 | 3 |
| C | 3 | 2 | 1 |
| D | 2 | 3 | 1 |
| E | 1 | 3 | 2 |
| F | 1 | 3 | 2 |
| G | 3 | 1 | 2 |

1. Plurality voting (ignore rankings, each person only votes for their number 1 choice)
2. Borda count
3. Approval voting (ignore rankings, each person votes for their number 1, 2 and 3 choices)
4. Do you think the Condorcet method could apply to this situation? Explain why or why not.
5. Explain why, using the voting methods, Al Gore didn’t win the 2000 US Presidential election.

Teacher Answers:

1. a. To select candidates for homecoming court, it would work well to use either weighted voting or plurality voting. Note: Borda Count would be difficult if all seniors are eligible candidates as it would be very time consuming. Case for weighted voting over plurality is that students are voting for the entire court, and not for king and queen.
	1. Plurality voting: Each voter votes for one queen and one king from the senior class. Then the queen and king candidates with the most votes are selected, depending on the size of the court.
	2. Weighted voting: Each voter is given a number of points, say the number of positions on the court, to divide among the candidates and the candidates with the most points are on the court.

b. To select student body president from a set of candidates, the simplest form would be plurality voting, in which the candidate with the most votes wins.

c. To select the 3 sodas for prom, either plurality or borda count. Plurality would be the easiest.

 i. Plurality: The three sodas with the most votes are served.

ii. Borda Count: Each voter ranks the soda from best to worst. Those ranked 1 are assigned 10 points, those ranked 2 are assigned 9 and so one with those ranked 10 assigned 1 point. Then the 3 sodas with the highest point totals are served.

1. Electing the US President. In the general election, there are two main party candidates and a number of small party candidates. Plurality voting is used within a state to determine the weighted voting used in the electoral college. Each state assigns its weight based upon the results of the popular vote.
2. a. Plurality: Chocolate is the winner with 3 first place votes.

b. Borda Count: Assign 3 points to first place votes, two to second and one point to third place votes. There is a tie between chocolate and strawberry.

 Chocolate has: 3+2+1+2+3+3+1= 15

 Vanilla has: 1+3+2+1+1+1+3= 12

 Strawberry has: 2+1+3+3+2+2+2= 15

c. Approval: Tally votes, that are 1st -3rd place. Since we only have three options, we obviously have a tie with each ice cream getting ten votes.

d. Condorcet: Here we could tally up our votes and make our Condorcet digraph very easily. If we were to look at chocolate vs. vanilla, we would see that for voter A chocolate wins because it had a higher ranking. If we look at voter B then vanilla wins because it had a higher ranking. If we continue to do this we get that in the pair-wise election between chocolate and vanilla, chocolate wins. Continuing on, in the pair-wise election between strawberry and vanilla, strawberry wins. And if we look at our pair-wise election between strawberry and chocolate we see that chocolate wins. We can now make our digraph that would look like:



where our arcs are directed towards the losers of the pair-wise elections. Since chocolate has an out-degree of 2 which is our n-1 value, we know that chocolate is the clear winner.

1. Al Gore lost the election be the weighted voting in the electoral college, which represented, but did not precisely describe the respective plurality winner in each state, gave George Bush as the winner.