

## Math 1015: Homework #2

**Question 1.** I'm voting with my friends about the best local dog salon. Our choices are "Snip Doggy Dog" (SDD), "Waggies" (Wa), "Woof" (Wo), and "Ruff Cut" (RC). (These are all real names of dog salons in Fairfield county. Unfortunately Snip Doggy Dog has closed.) People's votes are like this:

Me	Friend 1	Friend 2	Friend 3	Friend 4	Friend 5	Friend 6	Friend 7
SDD	RC	Wa	RC	Wo	Wa	Wo	RC
Wo	Wo	SDD	SDD	SDD	SDD	Wa	Wo
Wa	Wa	Wo	Wa	RC	Wo	SDD	Wa
RC	SDD	RC	Wo	Wa	RC	RC	SDD

Please determine the results if we are using:

- a) Condorcet's method
- b) Borda Count

**Question 2.** In the 1980 US senate race in New York, the candidates were D'Amato (D), Holtzman (H), and Javits (J). Based on polling people's opinions between the three, the population's preferences were something like this:

22%	23%	15%	29%	7%	4%
D	D	H	H	J	J
H	J	D	J	H	D
J	H	J	D	D	H

Please determine the results if we are using:

- a) Condorcet's method
- b) Borda Count

**Question 3.** Here is a speculative version of the August 2022 election in Alaska, which was a ranked choice election between Mary Peltola (M), Nick Begich (N), and Sarah Palin (S). I have speculated by filling in choices based on the simple political spectrum (M is left, N is center, S is right). This election might have looked like this:

76	59	27	15	11
M	S	N	N	N
N	N	S	M	
S	M	M	S	

(This is partially speculative: the actual voting data was not fully released by the state of Alaska. You can see the official numbers here: <https://www.elections.alaska.gov/results/22SSPG/RcvDetailedReport.pdf>)

- a) Please determine the results if we are using ranked choice. (For the people who voted only N, their votes are eliminated entirely after N is eliminated.)
- b) Please determine the results if we are using the Borda Count. (The last column should give no points to either M or S.)

- c) If the first column of voters instead voted simply “M” (with no rankings for second or third place), would this change the result using ranked choice?
- d) If the first column of voters instead voted simply “M” (with no rankings for second or third place), would this change the result using Borda?

**Question 4.** Explain why the Borda count satisfies the Unanimity criterion.

**Question 5.** Explain why the Condorcet method satisfies the Unanimity criterion.

**Question 7.** Explain why Ranked Choice Voting satisfies the Majority criterion.