

To receive full credit for this 100 point Exam, you must show ALL work. Feel free to use the back if need be, but label what is on the back.

1. (*15 points*) You are the member of a club with 37 members, and everybody in the club loves a good pizza. So you decided to choose a pizza place by having the members rank their favorite pizza places, with the following choices: Spinellis (S), Boombozz (B), Impellizzeris (I), and Wicks (W). Use the following preference schedule to solve problems 1-4.

Number of Voters:	13	10	8	5	1
First	S	B	W	I	B
Second	I	I	B	W	W
Third	B	W	I	B	I
Fourth	W	S	S	S	S

What is the winner using the method of Pairwise Comparisons? Does this voting method show a violation of Condorcet Fairness Criterion? Does this voting method show a violation of Majority Criterion? Explain your answer.

2. (*15 points*) Using the voting preference from number 1. Find the winner of the election using the Borda Count Method. Does this voting method show a violation of Condorcet Fairness Criterion? Does this voting method show a violation of Majority Criterion? Explain your answer.

Number of Voters:	13	10	8	5	1
First	S	B	W	I	B
Second	I	I	B	W	W
Third	B	W	I	B	I
Fourth	W	S	S	S	S

3. (*13 points*) Using the voting preference from number 1. Find the winner of the election using the Plurality. Does this voting method show a violation of Condorcet Fairness Criterion? Does this voting method show a violation of Majority Criterion? Explain your answer.

4. (*13 points*) Using the voting preference from number 1. Find the winner of the election using the Plurality with elimination. Does this voting method show a violation of Condorcet Fairness Criterion? Does this voting method show a violation of Majority Criterion? Explain your answer.

5. (10 points) A town has three districts, A, B, and C, and a force of 35 police officers. The population of the three districts are shown below. Apportion the police officers using the Hamilton Method

District:	Population	Standard Quota	Lower Quota	Extra Seat?	Hamilton Apport.
A	9,900				
B	6,615				
C	4,485				

6. (10 points) A town has three districts, A, B, and C, and a force of 35 police officers. The population of the three districts are shown below. Apportion the police officers using the Hamilton Method

District:	Population	Standard Quota	Lower Quota	Extra Seat?	Hamilton Apport.
A	9,955				
B	6,915				
C	4,480				

7. (2 points) What is the name of the paradox that the previous 2 examples demonstrates?

8. (10 points) A clinic has 225 nurses working four shifts. The number of nurses working each shift is to be apportioned using the Jefferson Method, according to the average number of patients in that shift. Apportion the nurses to the shifts using the Jefferson Method.

Shift:	Avg # of Patients	Standard Quota	Round	New Quotient	Round	Jefferson Apport.
A	869					
B	1025					
C	619					
D	187					

9. (10 points) A clinic has 225 nurses working four shifts. The number of nurses working each shift is to be apportioned using the Webster Method, according to the average number of patients in that shift. Apportion the nurses to the shifts using the Webster Method.

Shift:	Avg # of Patients	Standard Quota	Round	New Quotient	Round	Webster Apport.
A	869					
B	1025					
C	619					
D	187					

10. (2 points) Do the Webster and/or Jefferson Methods violate the Quota Rule?