

Discrete Math
Chapter One Review

Name: _____

Date: _____ **Period:** _____

Answer each question clearly and completely. Be sure your work is legible.

I. Match each voting type to its definition.

- _____ 1. Borda Method
 - _____ 2. Winning Coalition
 - _____ 3. Approval Voting
 - _____ 4. Runoff Method
 - _____ 5. Plurality Method
 - _____ 6. Majority Method
 - _____ 7. Condorcet Method
 - _____ 8. Weighted Voting
 - _____ 9. Nondictatorship
 - _____ 10. Individual Sovereignty
 - _____ 11. Freedom from Irrelevant Alternatives
 - _____ 12. Uniqueness of Group Ranking
 - _____ 13. Unanimity
- A. A voter may vote for as many choices as he/she desires.
 - B. The preference schedule with the most first place rankings wins.
 - C. The method of producing the group ranking should give the same result whenever it is applied to a given set of preferences. The group ranking should also be transitive.
 - D. The preferences of a single individual should not become the group ranking without considering the preferences of the others.
 - E. A coalition that has the required amount of votes to pass.
 - F. Each choice is eliminated one at a time by comparing the number of first place rankings after each round.
 - G. The winning choice should still win if one of the other choices is removed.
 - H. Preference schedules are used to eliminate choices. The first step is to eliminate all except the top two.
 - I. Each individual should be allowed to order the choices in any way and to indicate ties.
 - J. Pairwise voting is conducted between every pair of choices and the choice that outranks the most of the other choices is the winner.
 - K. Assigning a point total to a ranking and totaling the points to determine a winner.
 - L. The preference schedule with 50% or more of the votes wins.
 - M. If every individual prefers one choice to another, then the group ranking should do the same.
 - N. Each voter is assigned a certain number of votes. Coalitions are formed that show all the possible ways of voting.

II. Answer each of the following questions in complete sentences.

14. An election is held among four candidates A, B, C, and D using the 4-3-2-1 Borda Count. There are 35 voters. Suppose that after the ballots are in and the points tallied, A gets 77 points, B gets 103 points, and C gets 80 points. Who is the Borda Count winner and why?

15. The 24 students on the high school yearbook staff wish to purchase a gift for their advisor. The four items under consideration are a scarf, dinner, theater tickets, and a vase. Assume that they vote sincerely and their preference schedules are as follows:

First choice	scarf	dinner	tickets	vase
Second choice	tickets	vase	dinner	dinner
Third choice	vase	tickets	vase	scarf
Fourth choice	dinner	scarf	scarf	tickets
<i>Total votes</i>	9	5	4	6

- What choice will the group make if the plurality method is used? Is this choice a good one?
- If the two gifts with the fewest first place votes are eliminated and a run off between the remaining two occurs, which gift will be selected?
- If the two gifts with the most last place votes are eliminated and a run off between the remaining two occurs, which gift will be selected?
- Is there a Condorcet winner?

16. Consider the weighted voting situation in which voters A, B, C, and D have 17, 14, 8, and 5 votes respectively, and 26 votes are needed to pass an issue.

- Is the coalition formed by B, C, and D a winning coalition?
- Which players are essential in the coalition $\{A, B, C; 39\}$?
- Which players are essential in the coalition $\{A, B, C, D; 44\}$?
- List all the winning coalitions.
- Find the power index for each voter.

17. In each of the following, determine whether any voter is a dictator and whether any is a dummy. 20 votes are needed to pass an issue.

- A: 10 votes B: 8 votes C: 6 votes D: 3 votes
- A: 20 votes B: 10 votes C: 8 votes D: 1 vote
- A: 14 votes B: 8 votes C: 3 votes D: 2 votes