

D1-D4 Chapter Review – Extra Practice

D1 Voting Methods

1. Consider a city council election where there are two Democrats: Don and Key, and two Republicans, Elle and Fant. Answer the questions below and determine the winner under each type of voting.

	300	219	281	210
1 st choice	Elle	Don	Key	Fant
2 nd choice	Fant	Key	Don	Don
3 rd choice	Don	Elle	Fant	Elle
4 th choice	Key	Fant	Elle	Key

- How many people voted?
- How many votes are needed for a majority win?
- How many votes are needed for plurality win (at a minimum)?
- Find the winner of the Plurality Method.
- Find the winner of the Instant Runoff Method.
- Find the winner of the Point System or Borda Count Method.
- Find the winner of the Condorcet Method or Pairwise Comparisons Method.

D2 Voting Power

2. Consider a hypothetical country with 6 states. The population and number of electoral votes are shown in the table below.

State	Population (millions)	Number of delegates/electors	Electors/millions of people
Utopia	4.5	11	
Verity	10.5	19	
Windfall	3.2	9	
Xanadu	0.5	3	
Yorkshire	8.0	17	
Zodiac	1.5	5	

a. Calculate the voting power per state (Electors per millions of people) to complete the table.

b. Which state or states have the most electoral power?

c. Which state or states have the least electoral power?

d. Assume that each state gives either all or none of its electoral votes to the winning candidate in their state. What is the fewest number of states (and which states) must a candidate carry in order to win the election? Explain

D3 Apportionment

3. A small country has four states whose populations are listed below. Their legislature has 116 seats. Determine the number of seats that each state would get using the methods below. Adapted from David Lippman, <http://www.opentextbookstore.com/mathinsociety/index.html>

a. Hamilton’s Method

<u>State</u>	<u>Population</u>	<u>Standard Quota</u>	<u>Initial or Minimum</u>	<u>Final</u>
North	33,700			
South	559,500			
East	141,300			
West	89,100			
Total				
Divisor				

b. Jefferson’s Method

<u>State</u>	<u>Population</u>	<u>Standard Quota</u>	<u>Initial</u>	(trials)	<u>Final</u>
North	33,700				
South	559,500				
East	141,300				
West	89,100				
Total					
Divisor					

Webster’s and the Hill-Huntington Methods will not be on the final.

D4 Gerrymandering

4. A State map is shown below. Tally the voters and use the information to answer the questions below.

a. Calculate the results of an election and the efficiency gap.

Election Results:

Democrats win

_____ seats

Republicans win

_____ seats

District	D Votes	R Votes	D Surplus or Wasted Votes	R Surplus or Wasted Votes
1				
2				
3				
4				
5				
6				
Total				

Efficiency Gap

$$\frac{\text{Party A Wasted Votes} - \text{Party B Wasted Votes}}{\text{Total Votes}}$$

b. Calculate the percentage of voters that each seat represents.

c. Compare the efficiency gap with the percentage for each seat. How many seats is the efficiency gap worth?

d. Is this a fair map? Why or why not?

