**Chapter 1**

An election at school is being held to determine the next senior class president. The preference schedule is provided below.

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| --- | --- | --- | --- | --- |
| Number of Voters | 20 | 22 | 12 | 9 |
| 1st Choice | D | C | B | A |
| 2nd Choice | E | A | C | D |
| 3rd Choice | A | B | E | B |
| 4th Choice | B | D | A | C |
| 5th Choice | C | E | D | E |

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| 1. | Determine the winner using the Plurality Method. |
| 2. | Determine the Borda Count winner. |
| 3. | Determine the winner using the Plurality with Elimination Method. |
| 4. | Complete the table. Determine the winner using the Pairwise Comparison Method.

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| --- | --- | --- | --- | --- | --- | --- |
|  | A | B | C | D | E | Points |
| A | X |  |  |  |  |  |
| B |  | X |  |  |  |  |
| C |  |  | X |  |  |  |
| D |  |  |  | X |  |  |
| E |  |  |  |  | X |  |

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| 5. | If E is eliminated, what is the new preference schedule?

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| --- | --- | --- | --- | --- |
| Number of Voters | 0000 | 0000 | 0000 | 0000 |
| 1st Choice |  |  |  |  |
| 2nd Choice |  |  |  |  |
| 3rd Choice |  |  |  |  |
| 4th Choice |  |  |  |  |

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| 6. | Define the majority criterion.  |
| 7. | Define the Condorcet criterion. |
| 8. | Define the monotonocity criterion. |
| 9. | Define the independence of irrelevant alternatives criterion. |
| **Chapter 2**Weighted Voting System: [24: 18, 13, 7] |
| 10. | List all the Banzhaf coalitions. Circle the winning coalitions. |
| 11. | Determine the Banzhaf power distribution in percent.

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|  | P1 =00 | P2 =00 | P3 =00 |
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| Power Distribution |  |  |  |

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| 12. | Determine the Shapley-Shubik power distribution in percent.

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| --- | --- | --- | --- |
|  | P1 =00 | P2 =00 | P3 =00 |
|  |  |  |  |
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| Power Distribution |  |  |  |

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| 13. | Which weighted voting system will produce i) a dictator, ii) a dummy, iii) a player with veto power? Select all that apply.a) [10: 15, 7, 2] b) [16: 15, 7, 2] c) [21: 15, 7, 2] d) [23: 15, 7, 2]  |
| **Chapter 3** |
| Abraham, Benjamin, and Caleb are sharing a round half vanilla-half chocolate cake. The following table gives the value of each slice in the eyes of each of the players.

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| --- | --- | --- | --- |
|  | Abraham | Benjamin | Caleb |
| Vanilla | 15 | 20 | 18 |
| Chocolate | 19 | 23 | 26 |

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| 14. | Determine the fair share of each player. |
| 15. | Using the lone-divider method, how would Abraham cuts up the cake into three equal fair shares?  |
| 16. | Following problem #15, what would be each person’s bid? |

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| 17. | If Abraham, Benjamin, and Caleb bid as shown in the table, what are the possible fair divisions?

|  |  |  |  |
| --- | --- | --- | --- |
|  | Abraham | Benjamin | Caleb |
| Bids | s1, s2 | s1, s3 | s2, s3 |

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| 18. | Using the lone-chooser method, if Abraham divides first, how would he divide the cake? |
| 19. | Following problem #18, if Benjamin were to divide next, which share would he choose? |
| 20. | Using the last diminisher method, where the order of play is Abraham, Benjamin, and Caleb, and Abraham starts with 180° of vanilla; who would diminish at the end of Round 1? |
| 21. | Following problem #20, what would the fair shares be for the two remaining players in Round 2? |

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| 22. | Using the method of sealed bids, what is the first settlement (without surplus) given the table below?

|  |  |  |  |
| --- | --- | --- | --- |
|  | Abraham | Benjamin | Caleb |
| Blue Ray player | 80 | 90 | 95 |
| MP3 player | 70 | 75 | 100 |
| Cell Phone | 35 | 60 | 55 |
| Fair Share |  |  |  |

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| 23. | Following problem #22, what is the total surplus (before each person receives part)? What is the final settlement? |
| 24. | Using the method of markers, what is the initial allocation (without surplus) given the information below? |
| **Chapter 4** |
| The convenience store down the street is under new management. The manager is making the work schedule for the 20 employees.

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| --- | --- | --- | --- |
| Shift | Morning | Afternoon | Night |
| Number of Customers | 200 | 320 | 275 |

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| 25. | Apportion the shifts using the Webster Method. |

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| --- | --- |
| 26. | Using the Webster Method, what is the initial standard quota for the afternoon shift? What does this represent? |
| 27. | Using the Hamilton Method, we get the following standard quotas in the table. What is the apportionment?

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| --- | --- | --- | --- |
| Shift | Morning | Afternoon | Night |
| Standard Quota | 5.03 | 8.05 | 6.92 |

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| 28. | Using the Jefferson’s Method, what are the initial modified quotas? What should be adjusted?

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| --- | --- | --- | --- |
| Shift | Morning | Afternoon | Night |
| Quota |  |  |  |

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| 29. | Using the Adam’s Method, what are the initial modified quotas? What should be adjusted?

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| --- | --- | --- | --- |
| Shift | Morning | Afternoon | Night |
| Quota |  |  |  |

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| 30. | Given the following table, what is the total number of customers if there are 25 employees? Round to the nearest whole number.

|  |  |  |  |
| --- | --- | --- | --- |
| Shift | Morning | Afternoon | Night |
| Standard Quota | 10.23 | 15.29 | 4.54 |

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