Exam 1 on Chapters 1 and 3

Name______________________________

You must show your work for each question to get full credit for that answer. Each question is worth 10 points. The right answer with no work or the wrong work is worth 4 out of 10 points. Numbers 5 is an exception. No work is necessary for this problem.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

For an election with four candidates (A, B, C, and D) we have the following preference schedule:

<table>
<thead>
<tr>
<th>Number of voters</th>
<th>15</th>
<th>11</th>
<th>9</th>
<th>6</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st choice</td>
<td>A</td>
<td>C</td>
<td>D</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>2nd choice</td>
<td>B</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>3rd choice</td>
<td>C</td>
<td>D</td>
<td>B</td>
<td>C</td>
<td>B</td>
</tr>
<tr>
<td>4th choice</td>
<td>D</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

1) Using the plurality-with-elimination method, which candidate wins the election?
   A) A
   B) B
   C) C
   D) D
   E) None of the above

   Round 1: A BC D  
   15 6 13 9 Eliminate B
   Round 2: 15 13 15 Eliminate C
   Round 3: 15 28 D wins

2) Using the recursive plurality-with-elimination ranking method, which candidate comes in second?
   A) A
   B) B
   C) C
   D) D
   E) None of the above

   Round 1: A BC  
   15 6 22 C has a majority so C wins
   The second place candidate is C

For an election with 4 candidates (A, B, C, and D) we have the following preference schedule:

<table>
<thead>
<tr>
<th>Number of Voters</th>
<th>27</th>
<th>19</th>
<th>8</th>
<th>15</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Choice</td>
<td>B</td>
<td>A</td>
<td>D</td>
<td>C</td>
<td>A</td>
</tr>
<tr>
<td>2nd Choice</td>
<td>D</td>
<td>D</td>
<td>C</td>
<td>A</td>
<td>C</td>
</tr>
<tr>
<td>3rd Choice</td>
<td>A</td>
<td>C</td>
<td>A</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>4th Choice</td>
<td>C</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
</tbody>
</table>

3) In this election,
   A) A is a Condorcet candidate.
   B) B is a Condorcet candidate.
   C) C is a Condorcet candidate.
   D) D is a Condorcet candidate.
   E) None of the above
For an election with four candidates (A, B, C, and D) we have the following preference schedule:

<table>
<thead>
<tr>
<th>Number of voters</th>
<th>15</th>
<th>11</th>
<th>9</th>
<th>6</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st choice</td>
<td>A</td>
<td>C</td>
<td>D</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>2nd choice</td>
<td>B</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>3rd choice</td>
<td>C</td>
<td>D</td>
<td>B</td>
<td>C</td>
<td>B</td>
</tr>
<tr>
<td>4th choice</td>
<td>D</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

4) Using the Borda count method, which candidate wins the election?

A) A  
B) B  
C) C  
D) D  
E) None of the above

Solve the problem.

5) "If choice X is a winner of an election and one (or more) of the other choices is removed and the ballots recounted, then X should still be a winner of the election." This fairness criterion is called the

A) Condorcet criterion.  
B) independance of irrelevant alternatives criterion.  
C) majority criterion.  
D) monotonicity criterion.  
E) None of the above

Carli and Dave want to divide fairly the chocolate-strawberry cake shown below using the divider-chooser method. The total cost of the cake was $18.00. Carli values strawberry or banana equally, but values chocolate twice as much. Dale values chocolate three times as much as he values banana. Further, he values strawberry twice as much as he values banana.

![Cake diagram]

6) In Dale's eyes, the chocolate half of the cake is worth

A) $12.00  
B) $12.50  
C) $15.00  
D) $10.00  
E) None of the above
Angela and Ben want to divide fairly the chocolate-strawberry cake shown below using the divider-chooser method. The total cost of the cake was $6.00. Angela values strawberry three times as much as she values chocolate, while Ben values chocolate twice as much as he values strawberry.

7) In Ben's eyes, the piece shown below is worth

\[
\frac{3}{4} (4) = 3 \\
\frac{1}{4} (2) = \frac{1}{2}
\]

A) $3.50.  
B) $2.50.  
C) $4.00.  
D) $3.00.  
E) None of the above

Four players (A, B, C, and D) agree to divide the 16 items below using the method of markers.

Each of the player's three markers are placed as follows:
A: immediately to the right of items 1, 6, 12
B: immediately to the right of items 3, 8, 15
C: immediately to the right of items 2, 9, 14
D: immediately to the right of items 2, 7, 12.

8) Item 15
A) goes to A.  
B) goes to B.  
C) goes to C.  
D) goes to D.  
E) is left over.

9) Item 11
A) goes to A.  
B) goes to B.  
C) goes to C.  
D) goes to D.  
E) is left over.
Three heirs (A, B, and C) must fairly divide an estate consisting of two items – a house and a boat – using the method of sealed bids. The players' bids (in dollars) are:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>House</td>
<td>180,000</td>
<td>190,000</td>
<td>200,000</td>
</tr>
<tr>
<td>Boat</td>
<td>42,000</td>
<td>50,000</td>
<td>31,000</td>
</tr>
</tbody>
</table>

Estate In: 123.

10) The original fair share of player C is worth
   A) $77,000.
   B) $200,000.
   C) $231,000.
   D) $80,000.
   E) None of the above

11) After the initial allocations to each player are made, there is a surplus of
   A) $49,000.
   B) $23,000.
   C) $10,333.33.
   D) $19,000.
   E) None of the above

Surplus $19.
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) D ✓
2) C ✓
3) A ✓
4) B ✓
5) B ✓
6) A ✓
7) A ✓
8) E ✓
9) C ✓
10) A
11) D