

Math 101 Practice First Midterm

The actual midterm will probably not be multiple choice. You should also study your notes, the textbook, and the homework.

Answers are on the last page.

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:

Number of Voters	6	3	5	8
1st choice	D	D	A	C
2nd choice	B	A	C	A
3rd choice	A	B	B	D
4th choice	C	C	D	B

- 1) Using the plurality method, which candidate wins the election? 1) _____
A) A B) B C) C D) D

- 2) Using the Borda count method, which candidate wins the election? 2) _____
A) A B) B C) C D) D

- 3) Using the plurality-with-elimination method, which candidate wins the election? 3) _____
A) A
B) B
C) C
D) D
E) None of the above

- 4) Using the method of pairwise comparisons, which candidate wins the election? 4) _____
A) A
B) B
C) C
D) D
E) None of the above

- 5) In this election, 5) _____
A) B is a Condorcet candidate.
B) A is a Condorcet candidate.
C) every candidate is a Condorcet candidate.
D) there is no Condorcet candidate.
E) None of the above

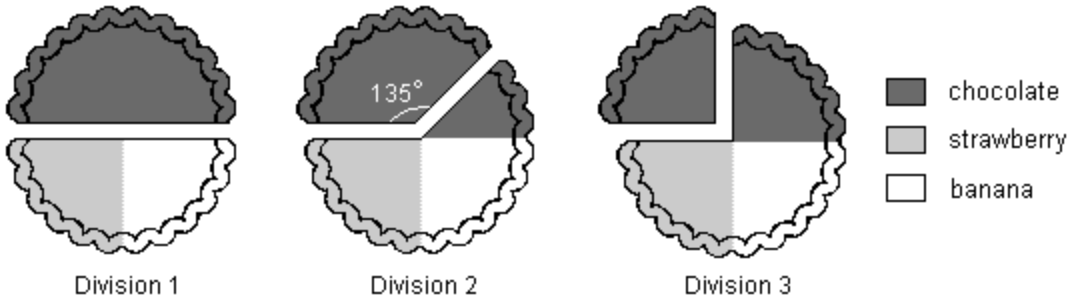
Solve the problem.

- 6) An election is held among four candidates (A, B, C, and D). Using a voting method we will call X, the winner of the election is candidate A. Due to an irregularity in the original vote count, a recount is required. Before the recount takes place, candidate B drops out of the race. In the recount, still using voting method X, candidate D wins the election. Based on this information, we can say that voting method X violates the 6) _____
- A) independence of irrelevant alternatives criterion.
 - B) monotonicity criterion.
 - C) Condorcet criterion.
 - D) majority criterion.
 - E) None of the above
- 7) An election is held among four candidates (A, B, C, and D). Using a voting method we will call X, the winner of the election is candidate A. However, candidate D beats each other candidate in a head to head, pairwise comparison. Based on this information, we can say that voting method X violates the 7) _____
- A) independence of irrelevant alternatives criterion.
 - B) majority criterion.
 - C) Condorcet criterion.
 - D) monotonicity criterion.
 - E) None of the above
- 8) Arrow's Impossibility Theorem implies 8) _____
- A) that it is impossible to have a voting method that satisfies all four of the fairness criteria.
 - B) that in every election, no matter what voting method we use, at least one of the four fairness criteria will be violated.
 - C) that every voting method can potentially violate each one of the four fairness criteria.
 - D) that in every election, each of the voting methods must produce a different winner.
 - E) None of the above
- 9) An election is held among five candidates (A, B, C, D, and E) and A gets a majority of the first place votes but B wins the election. Which of the following methods could have been the method used to decide this election? 9) _____
- A) The plurality-with-elimination method
 - B) The Borda count method
 - C) The method of pairwise comparisons
 - D) All of the above
 - E) None of the above

Carli and Dale 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 and banana equally, but values chocolate twice as much as either of these put together. Dale values chocolate three times as much as he values strawberry. Further, he values strawberry twice as much as he values banana.

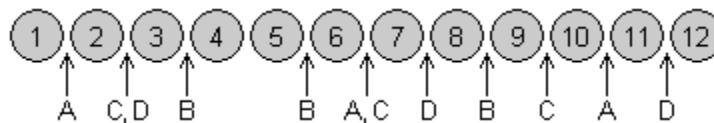


10) If Carli is the divider, which of the divisions shown below is consistent with Carli's value system? 10) _____



- Division 1
 Division 2
 Division 3
- A) Division 1
 B) Division 2
 C) Division 3
 D) All of the above
 E) None of the above

Four players (A, B, C, and D) agree to divide the 12 items below using the method of markers. The players' bids are as indicated.



11) Item 5 11) _____
 A) goes to D.
 B) is left over.
 C) goes to B.
 D) goes to C.
 E) goes to A.

12) Item 10 12) _____
 A) goes to A.
 B) goes to B.
 C) goes to C.
 D) goes to D.
 E) is left over.

Four heirs (A, B, C, and D) must divide fairly an estate consisting of three items — a house, a cabin and a boat — using the method of sealed bids. The players' bids (in dollars) are:

	A	B	C	D
House	180,000	200,000	190,000	185,000
Cabin	60,000	50,000	40,000	55,000
Boat	16,000	12,000	18,000	10,000

- 13) After all is said and done, the final allocation to player B is 13) _____
- A) the house plus \$6000 in cash.
 - B) the house minus \$128,500 in cash.
 - C) \$65,500 in cash.
 - D) the house minus \$134,500 in cash.
 - E) None of the above

Solve the problem.

- 14) Which of the following is a discrete fair division problem? 14) _____
- A) Dividing a tropical island.
 - B) Dividing a cheese pizza.
 - C) Dividing a gallon of ice cream.
 - D) Dividing an antique car collection.
 - E) None of the above

- 15) Which of the following is a continuous fair division problem? 15) _____
- A) Dividing the family jewels.
 - B) Dividing an art collection.
 - C) Dividing a house plus all the furniture in it.
 - D) Dividing a cream pie.
 - E) None of the above

- 16) Joe and Bill want to divide a cake using the divider-chooser method. They draw straws, and it is determined that Bill will be the divider and Joe the chooser. Assuming that each plays the game correctly, which of the following statements [A), B), C) or D)] cannot be true? 16) _____
- A) Bill believes that Joe's share is worth 50% of the cake; Joe believes that his share is worth 60% of the cake.
 - B) Bill believes that his share is worth 60% of the cake; Joe believes that his share is worth 50% of the cake.
 - C) Joe believes that his share is worth 50% of the cake; Bill believes that his share is worth 50% of the cake.
 - D) Joe believes that his share is worth 60% of the cake; Bill believes that his share is worth 50% of the cake.
 - E) None of the above

Answer Key

Testname: PRACTICEMT1

- 1) D
- 2) A
- 3) C
- 4) A
- 5) B
- 6) A
- 7) C
- 8) A
- 9) B
- 10) B
- 11) C
- 12) E
- 13) B
- 14) D
- 15) D
- 16) B