Exam

Name_____

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

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

Number of voters	20	14	8	7	2
1st choice	A	C	D	C	D
2nd choice	B	B	B	D	A
3rd choice	C	D	A	B	B
4th choice	D	A	C	A	C

1) How many pairwise comparisons does candidate A win?   1) _____
    A) 0
    B) 1
    C) 2
    D) 3
    E) none of these

  Answer: B
  Explanation: A)
                  B)
                  C)
                  D)
                  E)

2) In this election,   2) _____
    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 these

  Answer: B
  Explanation: A)
                  B)
                  C)
                  D)
                  E)

The cities of Beijing, Sydney, Manchester, Berlin, and Istanbul each vied to hold the 2000 Summer Olympics. There was an election using plurality with elimination. Four rounds worth of Olympic Committee voting are shown in the table below.

	1st round	2nd round	3rd round	4th round
Beijing	32	37	40	43*
Sydney	30	30	37	45
Manchester	11	13	11*	
Berlin	9	9*		
Istanbul	7*			

* Eliminated

3) Why is it that these results could not have come from preference ballots?   3) _____
    A) Beijing had more first place votes in the first round, but lost the election.
    B) Berlin received the same number of votes in the first and second rounds.
    C) The number of votes for Manchester decreased between the second and third round.
    D) Beijing had a plurality in the first three rounds of voting, but lost the election.
    E) none of these
  Answer: C
  Explanation: A)
                B)
                C)
                D)
                E)

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

Number of voters	20	14	8	7	2
1st choice	A	C	D	C	D
2nd choice	B	B	B	D	A
3rd choice	C	D	A	B	B
4th choice	D	A	C	A	C

4) Using the Borda count method, the winner of the election is   4) _____
    A) A.
    B) B.
    C) C.
    D) E.
    E) none of these
  Answer: A
  Explanation: A)
                B)
                C)
                D)
                E)

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

5) The ranking of the candidates using the Borda count method is   5) _____

    A) first: D; second: A; third: C; fourth: B.

    B) first: A; second: C; third: D; fourth: B.

    C) first: A; second: D; third: C; fourth: B.

    D) first: D; second: C; third: A; fourth: B.

    E) none of these

  Answer: C

  Explanation: A)

                    B)

                    C)

                    D)

                    E)

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

Number of voters	15	11	9	6	2
1st choice	A	C	D	B	C
2nd choice	B	B	C	D	D
3rd choice	C	D	B	C	B
4th choice	D	A	A	A	A

6) Using the plurality-with-elimination method, which candidate is eliminated second?   6) _____

    A) A

    B) B

    C) C

    D) D

    E) none of these

  Answer: C

  Explanation: A)

                    B)

                    C)

                    D)

                    E)

Solve the problem.

7) An election is held for president of the United States. Three candidates are running: a Democrat, a   7) _____
Republican, and an Independent. A certain voter prefers the Independent candidate over the other
two, but realizing (because of all the pre-election polls) the race is going to be a close race
between the Democrat and the Republican and that the Independent doesn't have a chance, he
votes instead for his second choice (his preference between the Democrat and the Republican).
This is an example of

A) insincere voting.

B) the monotonicity criterion.

C) the majority criterion.

D) the independence of irrelevant alternatives criterion.

E) none of these

Answer: A

Explanation: A)

B)

C)

D)

E)

8) The Borda count method satisfies   8) _____

A) the Condorcet criterion.

B) the monotonicity criterion.

C) the majority criterion.

D) All three of the above

E) none of these

Answer: B

Explanation: A)

B)

C)

D)

E)

4

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

Number of voters	15	11	9	6	2
1st choice	A	C	D	B	C
2nd choice	B	B	C	D	D
3rd choice	C	D	B	C	B
4th choice	D	A	A	A	A

9) Which candidate wins in the pairwise comparison between candidate B and candidate C?　　　9) _____

    A) Neither - it is a tie.

    B) B

    C) C

    D) Cannot be determined from the information given.

    E) none of these

Answer: C

Explanation: A)

                  B)

                  C)

                  D)

                  E)

Solve the problem.

10) An election involving 6 candidates and 20 voters is held and the results of the election are to be　　　10) _____
determined using the Borda count method. The minimum number of points a candidate can
receive is

    A) 120 points.

    B) 60 points.

    C) 15 points

    D) 20 points

    E) none of these

Answer: D

Explanation: A)

                  B)

                  C)

                  D)

                  E)

11) 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 procedures, a new election is required. Before the new election takes place, one of the voters changes his mind and moves A from third choice to second choice on his ballot. All other voters vote the same way they did in the original election. In the new election, still using voting method X, candidate D wins the election. Based on this information, we can say that voting method X violates the

11) _____

    A) Condorcet criterion.

    B) majority criterion.

    C) monotonicity criterion.

    D) independence of irrelevant alternatives criterion.

    E) none of these

Answer: C

Explanation: A)

                  B)

                  C)

                  D)

                  E)

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

12) Using the plurality method, which candidate wins the election?

12) _____

    A) A   B) B   C) C   D) D

Answer: D

Explanation: A)

                  B)

                  C)

                  D)

13) Using the plurality-with-elimination method, which candidate wins the election?

13) _____

    A) A

    B) B

    C) C

    D) D

    E) none of these

Answer: C

Explanation: A)

                  B)

                  C)

                  D)

                  E)

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

Number of voters	20	14	8	7	2
1st choice	A	C	D	C	D
2nd choice	B	B	B	D	A
3rd choice	C	D	A	B	B
4th choice	D	A	C	A	C

14) Using the plurality-with-elimination ranking method, which candidate comes in second?   14) _____

    A) A

    B) B

    C) C

    D) D

    E) none of these

Answer: C

Explanation: A)

                B)

                C)

                D)

                E)

Solve the problem.

15) "If there is a choice that has a majority of the first-place votes in an election, then that choice   15) _____
should be the winner of the election." This fairness criterion is called the

    A) monotonicity criterion.

    B) majority criterion.

    C) Condorcet criterion.

    D) independence of irrelevant alternatives criterion.

    E) none of these

Answer: B

Explanation: A)

                B)

                C)

                D)

                E)

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

Number of Voters	27	19	8	15	2
1st Choice	B	A	D	C	A
2nd Choice	D	D	C	A	C
3rd Choice	A	C	A	D	D
4th Choice	C	B	B	B	B

16) Using the plurality-with-elimination method, the winner of the election is   16) _____

    A) A.

    B) B.

    C) C.

    D) D.

    E) none of these

Answer: C

Explanation: A)

                  B)

                  C)

                  D)

                  E)

In a recent election involving three candidates, 20% of the voters preferred candidate A to C and C to B. Forty percent preferred candidate C the most and A the least. The other 900 voters preferred B the most and A the least.

17) How many people voted in this election?   17) _____

    A) 900

    B) 4500

    C) 1800

    D) 2250

    E) none of these

Answer: D

Explanation: A)

                  B)

                  C)

                  D)

                  E)

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

Number of voters	51	48	5
1st choice	A	D	E
2nd choice	B	C	C
3rd choice	C	B	D
4th choice	D	A	B
5th choice	E	E	A

18) Using the pairwise comparisons method, there is a candidate that loses every pairwise comparison between itself and the other candidates. That candidate is

18) _____

A) A.   B) B.   C) C.   D) D.   E) E.

Answer: E

Explanation: A)
                B)
                C)
                D)
                E)

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

Number of voters	20	14	8	7	2
1st choice	A	C	D	C	D
2nd choice	B	B	B	D	A
3rd choice	C	D	A	B	B
4th choice	D	A	C	A	C

19) Using the Borda count ranking method, which candidate comes in last?

19) _____

A) A
B) B
C) C
D) D
E) none of these

Answer: D

Explanation: A)
                B)
                C)
                D)
                E)

9

Solve the problem.

20) Arrow's Impossibility Theorem implies

    A) that in every election, no matter what voting method we use, at least one of the four fairness criteria will be violated.

    B) that it is impossible to have a voting method that satisfies all four of the fairness criteria.

    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 these

20) _____

Answer: B

Explanation: A)

                 B)

                 C)

                 D)

                 E)

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

Number of voters	15	11	9	6	2
1st choice	A	C	D	B	C
2nd choice	B	B	C	D	D
3rd choice	C	D	B	C	B
4th choice	D	A	A	A	A

21) In this election,

    A) C is a Condorcet candidate.

    B) D is a Condorcet candidate.

    C) every candidate is a Condorcet candidate.

    D) there is no Condorcet candidate.

    E) none of these

21) _____

Answer: A

Explanation: A)

                 B)

                 C)

                 D)

                 E)

Solve the problem.

22) "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) majority criterion.

    B) independence of irrelevant alternatives criterion.

    C) Condorcet criterion.

    D) monotonicity criterion.

    E) none of these

22) _____

Answer: B

Explanation: A)
                      B)
                      C)
                      D)
                      E)

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

Number of Voters	27	19	8	15	2
1st Choice	B	A	D	C	A
2nd Choice	D	D	C	A	C
3rd Choice	A	C	A	D	D
4th Choice	C	B	B	B	B

23) Using the plurality-with-elimination ranking method, which candidate comes in second?

    A) A

    B) B

    C) C

    D) D

    E) none of these

23) _____

Answer: B

Explanation: A)
                      B)
                      C)
                      D)
                      E)

24) Using the plurality method, the winner of the election is
    A) A.
    B) B.
    C) C.
    D) D.
    E) none of these

    Answer: B
    Explanation: A)
                   B)
                   C)
                   D)
                   E)

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

25) In this election,
    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 these

    Answer: B
    Explanation: A)
                   B)
                   C)
                   D)
                   E)

24) _____

25) _____

Solve the problem.

26) Consider an election with 456 voters and seven candidates. What is the smallest number of votes   26) _____
that a plurality candidate could have?

    A) 66

    B) 228

    C) 65

    D) 229

    E) none of these

Answer: A

Explanation: A)

                B)

                C)

                D)

                E)

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

Number of voters	15	11	9	6	2
1st choice	A	C	D	B	C
2nd choice	B	B	C	D	D
3rd choice	C	D	B	C	B
4th choice	D	A	A	A	A

27) The ranking of the candidates using the pairwise comparisons method is   27) _____

    A) first: C; second: B; third: A; fourth: D.

    B) first: C; second: A; third: D; fourth: B.

    C) first: B; second: C; third: A; fourth: D.

    D) first: C; second: B; third: D; fourth: A.

    E) none of these

Answer: D

Explanation: A)

                B)

                C)

                D)

                E)

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

Number of voters	20	14	8	7	2
1st choice	A	C	D	C	D
2nd choice	B	B	B	D	A
3rd choice	C	D	A	B	B
4th choice	D	A	C	A	C

28) How many Borda points does candidate D earn in this election?　　　　28) _____
    A) 109
    B) 144
    C) 123
    D) 134
    E) none of these

  Answer: A
  Explanation: A)
                B)
                C)
                D)
                E)

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

Number of voters	15	11	9	6	2
1st choice	A	C	D	B	C
2nd choice	B	B	C	D	D
3rd choice	C	D	B	C	B
4th choice	D	A	A	A	A

29) Using the Borda count method, which candidate wins the election?　　　　29) _____
    A) A
    B) B
    C) C
    D) D
    E) none of these

  Answer: B
  Explanation: A)
                B)
                C)
                D)
                E)

30) Using the plurality method, which candidate wins the election?   30) _____
    A) A
    B) B
    C) C
    D) D
    E) none of these

Answer: A
Explanation: A)
                  B)
                  C)
                  D)
                  E)

Solve the problem.

31) An election is held among six candidates. What is the total number of pairwise comparisons in   31) _____
this election?

    A) 2^6 B) $\dfrac{6 \times 5}{2}$ C) 2×6 D) 6   E) 6^2

Answer: B
Explanation: A)
                  B)
                  C)
                  D)
                  E)

32) An election is held among five candidates (A, B, C, D, and E) and A gets a majority of the first   32) _____
place votes but B wins the election. Which of the following methods could have been the method
used to decide this election?
    A) The plurality-with-elimination method
    B) The Borda count method
    C) The method of pairwise comparisons
    D) all of these
    E) none of these

Answer: B
Explanation: A)
                  B)
                  C)
                  D)
                  E)

33) An election is held among 21 candidates. What is the total number of pairwise comparisons in this election?

33) _____

A) 21^2 B) 2^{21} C) 21   D) 21×2 E) $\dfrac{21 \times 20}{2}$

Answer: E

Explanation: A)
B)
C)
D)
E)

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

Number of voters	15	11	9	6	2
1st choice	A	C	D	B	C
2nd choice	B	B	C	D	D
3rd choice	C	D	B	C	B
4th choice	D	A	A	A	A

34) How many Borda points does candidate D earn in this election?

34) _____

A) 121
B) 97
C) 88
D) 124
E) none of these

Answer: B

Explanation: A)
B)
C)
D)
E)

Solve the problem.

35) The plurality method violates

35) _____

A) the Condorcet criterion.
B) none of the four criteria.
C) the majority criterion.
D) the monotonicity criterion.
E) none of these

Answer: A

Explanation: A)
B)
C)
D)
E)

16

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

36) Using the method of pairwise comparisons, which candidate wins the election?   36) _____

    A) A

    B) B

    C) C

    D) D

    E) none of these

Answer: A

Explanation: A)

                B)

                C)

                D)

                E)

The cities of Beijing, Sydney, Manchester, Berlin, and Istanbul each vied to hold the 2000 Summer Olympics. There was an election using plurality with elimination. Four rounds worth of Olympic Committee voting are shown in the table below.

	1st round	2nd round	3rd round	4th round
Beijing	32	37	40	43*
Sydney	30	30	37	45
Manchester	11	13	11*	
Berlin	9	9*		
Istanbul	7*			

    * Eliminated

37) How many members are on the Olympic Committee?   37) _____

    A) 354

    B) 152

    C) 89

    D) 4

    E) none of these

Answer: C

Explanation: A)

                B)

                C)

                D)

                E)

Solve the problem.

38) The method of pairwise comparisons violates

    A) the monotonicity criterion.

    B) the Condorcet criterion.

    C) the majority criterion.

    D) the independence of irrelevant alternatives criterion.

    E) none of these

38) _____

Answer: D

Explanation: A)

                  B)

                  C)

                  D)

                  E)

39) 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 has more than 50% of the possible votes. Based on this information, we can say that voting method X violates the

    A) monotonicity criterion.

    B) independence of irrelevant alternatives criterion.

    C) majority criterion.

    D) Condorcet criterion.

    E) none of these

39) _____

Answer: C

Explanation: A)

                  B)

                  C)

                  D)

                  E)

40) "If there is a choice that in a head-to-head comparison is preferred by the voters over every other choice, then that choice should be the winner of the election." This fairness criterion is called the

    A) independence of irrelevant alternatives criterion.

    B) majority criterion.

    C) mononocity criterion.

    D) Condorcet criterion.

    E) none of these

40) _____

Answer: D

Explanation: A)

                  B)

                  C)

                  D)

                  E)

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

41) The ranking of the candidates using the pairwise comparisons method is
    A) first: A; second: C; third: D; fourth: B.
    B) first: A; second: D; third: C; fourth: B.
    C) first: D; second: A; third: C; fourth: B.
    D) first: D; second: C; third: A; fourth: B.
    E) none of these

41) _____

Answer: A
Explanation: A)
                  B)
                  C)
                  D)
                  E)

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

Number of voters	51	48	5
1st choice	A	D	E
2nd choice	B	C	C
3rd choice	C	B	D
4th choice	D	A	B
5th choice	E	E	A

42) Using the plurality-with-elimination method, the winner of the election is
    A) A.   B) B.   C) C.   D) D.   E) E.

42) _____

Answer: D
Explanation: A)
                  B)
                  C)
                  D)
                  E)

Solve the problem.

43) Consider an election using the plurality with elimination method illustrated in the table below.

43) _____

	1st round	2nd round	3rd round
A	5	5	5*
B	3	5	9
C	4	4*	
D	2*		

* Eliminated

19

Which of the following represents a possible preference table for this election?

A)

	5	4	3	2
1st choice	A	C	B	D
2nd choice	B	D	A	B
3rd choice	C	B	C	C
4th choice	D	A	D	A

B)

	5	4	3	2
1st choice	A	C	B	D
2nd choice	B	D	C	B
3rd choice	C	B	A	A
4th choice	D	A	D	C

C)

	5	4	3	2
1st choice	A	C	B	D
2nd choice	B	D	D	B
3rd choice	D	B	C	C
4th choice	C	A	A	A

D)

	5	4	3	2
1st choice	A	C	B	D
2nd choice	C	D	A	B
3rd choice	B	B	D	A
4th choice	D	A	C	C

E) all of these

Answer: E

Explanation: A)

                   B)

                   C)

                   D)

                   E)

44) An election involving 5 candidates and 30 voters is held, and the results of the election are to be   44) _____
determined using the Borda count method. Assuming there isn't a five-way tie, the minimum
number of points a winning candidate can receive is
  A) 91 points.
  B) 151 points.
  C) 31 points.
  D) 51 points.
  E) none of these

Answer: A

Explanation: A)
                B)
                C)
                D)
                E)

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

Number of voters	27	24	2
1st choice	A	B	C
2nd choice	C	C	B
3rd choice	B	A	A

45) Using the Borda count method, which candidate wins the election if candidate B drops out of the   45) _____
race?
  A) A
  B) A and C tie.
  C) C
  D) Cannot be determined from the information given.
  E) none of these

Answer: A

Explanation: A)
                B)
                C)
                D)
                E)

For an election with 6 candidates (A, B, C, D, E, and F), we have the following preference schedule:

Number of Voters	41	10	10	15	5
1st choice	B	F	A	A	E
2nd choice	A	A	E	F	F
3rd choice	D	E	F	E	A
4th choice	F	C	D	D	B
5th choice	E	D	C	B	D
6th choice	C	B	B	C	C

46) Using the method of pairwise comparisons, the winner of the election is   46) _____

    A) A.

    B) B.

    C) C.

    D) E.

    E) none of these

Answer: B

Explanation: A)

                    B)

                    C)

                    D)

                    E)

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

Number of Voters	27	19	8	15	2
1st Choice	B	A	D	C	A
2nd Choice	D	D	C	A	C
3rd Choice	A	C	A	D	D
4th Choice	C	B	B	B	B

47) Using the Borda count method, the winner of the election is   47) _____

    A) A.

    B) B.

    C) C.

    D) D.

    E) none of these

Answer: D

Explanation: A)

                    B)

                    C)

                    D)

                    E)

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

48) The ranking of the candidates using the plurality-with-elimination method is   48) _____

    A) first: C; second: A; third: B; fourth: D.

    B) first: C; second: D; third: A; fourth: B.

    C) first: C; second: A; third: D; fourth: B.

    D) first: D; second: C; third: A; fourth: B.

    E) none of these

Answer: B

Explanation: A)

                  B)

                  C)

                  D)

                  E)

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

Number of voters	27	24	2
1st choice	A	B	C
2nd choice	C	C	B
3rd choice	B	A	A

49) Using the Borda count method, the winner of the election is   49) _____

    A) B.

    B) A.

    C) C.

    D) A, B and C tie.

    E) A and B tie.

Answer: C

Explanation: A)

                  B)

                  C)

                  D)

                  E)

Solve the problem.

50) Consider an election using the plurality with elimination method illustrated in the table below.   50) _____

	1st round	2nd round
A	4	4*
B	3	5
C	2*	

* Eliminated

Which of the following represent a possible preference schedule for this election?

A)

	4	3	2
1st choice	A	B	C
2nd choice	C	A	B
3rd choice	B	C	A

B)

	4	3	2
1st choice	A	B	C
2nd choice	C	A	A
3rd choice	B	C	B

C)

	4	3	2
1st choice	A	B	C
2nd choice	B	C	B
3rd choice	C	A	A

D) Both ballots in A) and B) are possible.

E) none of these

Answer: D

Explanation: A)
               B)
               C)
               D)
               E)

24

51) An election is held among six candidates (A, B, C, D, E, and F). Using the method of pairwise comparisons, A gets 4 points; B gets $3\frac{1}{2}$ points; C gets $2\frac{1}{2}$ points; D gets 1 point, and E and F tie.

How many points does E get?

   A) 2

   B) $2\frac{1}{2}$

   C) 1

   D) $1\frac{1}{2}$

   E) none of these

Answer: A

Explanation: A)
                  B)
                  C)
                  D)
                  E)

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

Number of Voters	27	19	8	15	2
1st Choice	B	A	D	C	A
2nd Choice	D	D	C	A	C
3rd Choice	A	C	A	D	D
4th Choice	C	B	B	B	B

52) Using the method of pairwise comparisons, the winner of the election is

   A) A.

   B) B.

   C) C.

   D) D.

   E) none of these

Answer: A

Explanation: A)
                  B)
                  C)
                  D)
                  E)

53) Using the Borda count ranking method, which candidate comes in last?   53) _____
   A) A
   B) B
   C) C
   D) D
   E) none of these

Answer: B
Explanation: A)
                   B)
                   C)
                   D)
                   E)

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

Number of voters	15	11	9	6	2
1st choice	A	C	D	B	C
2nd choice	B	B	C	D	D
3rd choice	C	D	B	C	B
4th choice	D	A	A	A	A

54) Using the plurality-with-elimination method, which candidate wins the election?   54) _____
   A) A
   B) B
   C) C
   D) D
   E) none of these

Answer: D
Explanation: A)
                   B)
                   C)
                   D)
                   E)

Solve the problem.

55) An election is held among three candidates (A, B, and C) using the Borda count method. There are 20 voters. If candidate A received 37 points and candidate B received 39 points, how many points did candidate C receive?

55) _____

A) 38

B) 21

C) 44

D) Cannot be determined from the information given.

E) none of these

Answer: C

Explanation: A)
                  B)
                  C)
                  D)
                  E)

56) An election is held among six candidates (A, B, C, D, E and F) and A gets a plurality of the first place votes but C wins the election. Which of the following methods could have been the method used to decide this election?

56) _____

A) The Borda count method.

B) The method of pairwise comparisons.

C) The plurality-with-elimination method.

D) all of these

E) none of these

Answer: D

Explanation: A)
                  B)
                  C)
                  D)
                  E)

57) The plurality with elimination method satisfies

57) _____

A) the monotonicity criterion.

B) the majority criterion.

C) the Condorcet criterion.

D) All three of the above

E) none of these

Answer: B

Explanation: A)
                  B)
                  C)
                  D)
                  E)

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

Number of Voters	27	19	8	15	2
1st Choice	B	A	D	C	A
2nd Choice	D	D	C	A	C
3rd Choice	A	C	A	D	D
4th Choice	C	B	B	B	B

58) Using the pairwise comparison ranking method, which candidate comes in third?   58) _____

    A) A

    B) B

    C) C

    D) D

    E) none of these

Answer: C

Explanation: A)

                B)

                C)

                D)

                E)

Solve the problem.

59) An election is held among four candidates (A, B, C, and D). Using a voting method we will call X,   59) _____
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

    A) majority criterion.

    B) independence of irrelevant alternatives criterion.

    C) monotonicity criterion.

    D) Condorcet criterion.

    E) none of these

Answer: D

Explanation: A)

                B)

                C)

                D)

                E)

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

Number of voters	20	14	8	7	2
1st choice	A	C	D	C	D
2nd choice	B	B	B	D	A
3rd choice	C	D	A	B	B
4th choice	D	A	C	A	C

60) Using the method of pairwise comparisons, the winner of the election is   60) _____

    A) A.

    B) B.

    C) C.

    D) D.

    E) none of these

Answer: B

Explanation: A)

                  B)

                  C)

                  D)

                  E)

Solve the problem.

61) An election involving 6 candidates and 20 voters is held and the results of the election are to be   61) _____
determined using the Borda count method. Assuming there isn't a six-way tie, the maximum
number of points a losing candidate can receive is

    A) 70 points.

    B) 20 points.

    C) 60 points.

    D) 30 points.

    E) none of these

Answer: A

Explanation: A)

                  B)

                  C)

                  D)

                  E)

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

Number of voters	51	48	5
1st choice	A	D	E
2nd choice	B	C	C
3rd choice	C	B	D
4th choice	D	A	B
5th choice	E	E	A

62) Using the method of pairwise comparisons, the winner of the election is   62) _____

    A) A.   B) B.   C) C.   D) D.   E) E.

Answer: C

Explanation: A)
                      B)
                      C)
                      D)
                      E)

Solve the problem.

63) "If there is a Condorcet candidate in an election, then such a candidate should be the winner of the   63) _____
election." This statement is another way to phrase the

    A) Condorcet criterion.

    B) independence of irrelevant alternatives criterion.

    C) majority criterion.

    D) monotonicity criterion.

    E) none of these

Answer: A

Explanation: A)
                      B)
                      C)
                      D)
                      E)

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

Number of voters	20	14	8	7	2
1st choice	A	C	D	C	D
2nd choice	B	B	B	D	A
3rd choice	C	D	A	B	B
4th choice	D	A	C	A	C

64) Using the plurality-with-elimination method, the winner of the election is   64) _____

    A) A.

    B) B.

    C) C.

    D) D.

    E) none of these

Answer: A

Explanation: A)

                B)

                C)

                D)

                E)

Solve the problem.

65) An election is held among four candidates (A, B, C, and D) using the Borda count method. There   65) _____
are 30 voters. If candidate A received 93 points and candidate B received 57 points, and candidates
C and D tied, how many points did candidates C and D each receive?

    A) 150

    B) 75

    C) It is not possible to have ties using the Borda count.

    D) Cannot be determined from the information given.

    E) none of these

Answer: B

Explanation: A)

                B)

                C)

                D)

                E)

66) In a round robin tennis tournament, every player plays against every other player. If 11 players   66) _____
are entered in a round robin tennis tournament, how many matches will be played?

   A) 11^2 B) 11×2 C) 11×10 D) $\dfrac{11 \times 10}{2}$ E) 2^{11}

Answer: D

Explanation: A)
                B)
                C)
                D)
                E)

In a recent election involving three candidates, 20% of the voters preferred candidate A to C and C to B. Forty percent preferred candidate C the most and A the least. The other 900 voters preferred B the most and A the least.

67) How many Borda points would candidate C receive in this election?   67) _____

      A) 1800

      B) 4500

      C) 5400

      D) 900

      E) none of these

Answer: C

Explanation: A)
                B)
                C)
                D)
                E)

Solve the problem.

68) An election is held among four candidates (A, B, C, and D). Using a voting method we will call X,   68) _____
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

      A) Condorcet criterion.

      B) independence of irrelevant alternatives criterion.

      C) majority criterion.

      D) monotonicity criterion.

      E) none of these

Answer: B

Explanation: A)
                B)
                C)
                D)
                E)

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

69) Using the Borda count method, which candidate wins the election?   69) _____

    A) A   B) B   C) C   D) D

Answer: A

Explanation: A)

                     B)

                     C)

                     D)

Solve the problem.

70) An election involving 5 candidates and 30 voters is held, and the results of the election are to be   70) _____
determined using the Borda count method. The minimum number of points a candidate can
receive is

    A) 90 points.

    B) 50 points.

    C) 150 points.

    D) 30 points.

    E) none of these

Answer: D

Explanation: A)

                     B)

                     C)

                     D)

                     E)

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

Number of voters	15	11	9	6	2
1st choice	A	C	D	B	C
2nd choice	B	B	C	D	D
3rd choice	C	D	B	C	B
4th choice	D	A	A	A	A

71) The ranking of the candidates using the Borda count method is

    A) first: C; second: A; third: D; fourth: B.

    B) first: B; second: C; third: D; fourth: A.

    C) first: B; second: A; third: C; fourth: D.

    D) first: B; second: C; third: A; fourth: D.

    E) none of these

Answer: B

Explanation: A)

                B)

                C)

                D)

                E)

71) _____

Solve the problem.

72) In a round robin tennis tournament, every player plays against every other player. If 24 players are entered in a round robin tennis tournament, how many matches will be played?

    A) 2^{24} B) 24×23 C) 24×2 D) 24^2 E) $\dfrac{24 \times 23}{2}$

Answer: E

Explanation: A)

                B)

                C)

                D)

                E)

72) _____

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73) An election involving 6 candidates and 20 voters is held, and the results of the election are to be   73) _____
determined using the Borda count method. Assuming there isn't a six-way tie, the minimum
number of points a winning candidate can receive is

A) 81 points.

B) 71 points.

C) 91 points.

D) 61 points.

E) none of these

Answer: B

Explanation: A)

B)

C)

D)

E)

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

Number of voters	15	11	9	6	2
1st choice	A	C	D	B	C
2nd choice	B	B	C	D	D
3rd choice	C	D	B	C	B
4th choice	D	A	A	A	A

74) The ranking of the candidates using the plurality method is   74) _____

A) first: A; second: B; third: C; fourth: D.

B) first: A; second: C; third: D; fourth: B.

C) first: A; second: D; third: C; fourth: B.

D) first: A; second: D; third: B; fourth: C.

E) none of these

Answer: B

Explanation: A)

B)

C)

D)

E)

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

Number of voters	51	48	5
1st choice	A	D	E
2nd choice	B	C	C
3rd choice	C	B	D
4th choice	D	A	B
5th choice	E	E	A

75) Which candidate has the most second place votes?   75) _____

    A) A   B) B   C) C   D) D   E) E

Answer: C

Explanation: A)
                      B)
                      C)
                      D)
                      E)

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

Number of voters	20	14	8	7	2
1st choice	A	C	D	C	D
2nd choice	B	B	B	D	A
3rd choice	C	D	A	B	B
4th choice	D	A	C	A	C

76) Using the plurality-with-elimination method, which candidate is eliminated immediately before   76) _____
the winner of the election?

    A) A

    B) B

    C) C

    D) D

    E) none of these

Answer: C

Explanation: A)
                      B)
                      C)
                      D)
                      E)

77) Using the pairwise comparison ranking method, which candidates tie for second place?　　　　77) _____
    A) A and B
    B) B and C
    C) C and D
    D) A, C, and D
    E) none of these
  Answer: D
  Explanation:　　A)
　　　　　　　　　　B)
　　　　　　　　　　C)
　　　　　　　　　　D)
　　　　　　　　　　E)

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

78) The ranking of the candidates using the plurality method is　　　　　　　　　　78) _____
    A) first: D; second: A; third: C; fourth: B.
    B) first: D; second: A; third: B; fourth: C.
    C) first: D; second: C; third: A; fourth: B.
    D) first: C; second: D; third: A; fourth: B.
    E) none of these
  Answer: C
  Explanation:　　A)
　　　　　　　　　　B)
　　　　　　　　　　C)
　　　　　　　　　　D)
　　　　　　　　　　E)

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

Number of voters	15	11	9	6	2
1st choice	A	C	D	B	C
2nd choice	B	B	C	D	D
3rd choice	C	D	B	C	B
4th choice	D	A	A	A	A

79) How many pairwise comparisons does candidate B win?   79) _____

    A) 0

    B) 1

    C) 2

    D) 3

    E) none of these

Answer: C

Explanation: A)

                  B)

                  C)

                  D)

                  E)

Solve the problem.

80) An election involving 5 candidates and 30 voters is held, and the results of the election are   80) _____
determined using the Borda count method. The maximum number of points a candidate can
receive is

    A) 150 points.

    B) 50 points

    C) 30 points

    D) 90 points.

    E) none of these

Answer: A

Explanation: A)

                  B)

                  C)

                  D)

                  E)

81) An election is held among six candidates (A, B, C, D, E and F). There are 57 voters. Using the   81) _____
method of pairwise comparisons, A, B, and C win 2 pairwise comparisons each. D wins 4 pairwise
comparisons, E wins no pairwise comparisons, and F wins all the rest. In this election

   A) F is a Condorcet candidate.

   B) D is a Condorcet candidate.

   C) There is no Condorcet candidate.

   D) Cannot be determined from the information given.

   E) none of these

Answer: A

Explanation: A)

                 B)

                 C)

                 D)

                 E)

82) Consider an election with 769 voters and six candidates. What is the smallest number of votes that   82) _____
a plurality candidate could have?

   A) 385

   B) 384

   C) 128

   D) 129

   E) none of these

Answer: D

Explanation: A)

                 B)

                 C)

                 D)

                 E)

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

Number of voters	15	11	9	6	2
1st choice	A	C	D	B	C
2nd choice	B	B	C	D	D
3rd choice	C	D	B	C	B
4th choice	D	A	A	A	A

83) Using the method of pairwise comparisons, which candidate wins the election?   83) _____

    A) A

    B) B

    C) C

    D) D

    E) none of these

Answer: C

Explanation: A)

                  B)

                  C)

                  D)

                  E)

Solve the problem.

84) An election is held among five candidates (A, B, C, D, and E). There are 37 voters. Using the   84) _____
method of pairwise comparisons, A, B, and C win one pairwise comparison each. D wins three
pairwise comparisons, and E wins all the rest. In this election

    A) E is a Condorcet candidate.

    B) D is a Condorcet candidate.

    C) There is no Condorcet candidate.

    D) Cannot be determined from the information given.

    E) none of these

Answer: A

Explanation: A)

                  B)

                  C)

                  D)

                  E)

85) An election is held among six candidates (A, B, C, D, E, and F). Using the method of pairwise comparisons, A gets 5 points; B gets 4 points; C gets 2 points; D gets $1\frac{1}{2}$ points, and E gets 0 points. How many points does F get?

85)

   A) 2

   B) 3

   C) $1\frac{1}{2}$

   D) $2\frac{1}{2}$

   E) none of these

Answer: D

Explanation: A)

                B)

                C)

                D)

                E)

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

Number of voters	15	11	9	6	2
1st choice	A	C	D	B	C
2nd choice	B	B	C	D	D
3rd choice	C	D	B	C	B
4th choice	D	A	A	A	A

86) The ranking of the candidates using the plurality-with-elimination method is

86)

   A) first: C; second: A; third: D; fourth: B.

   B) first: D; second: A; third: C; fourth: B.

   C) first: D; second: C; third: B; fourth: A.

   D) first: C; second: D; third: A; fourth: B.

   E) none of these

Answer: B

Explanation: A)

                B)

                C)

                D)

                E)

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

Number of voters	51	48	5
1st choice	A	D	E
2nd choice	B	C	C
3rd choice	C	B	D
4th choice	D	A	B
5th choice	E	E	A

87) Using the Borda count method, the winner of the election is   87) _____

    A) A.   B) B.   C) C.   D) D.   E) E.

    Answer: C

    Explanation: A)
                         B)
                         C)
                         D)
                         E)

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

Number of voters	20	14	8	7	2
1st choice	A	C	D	C	D
2nd choice	B	B	B	D	A
3rd choice	C	D	A	B	B
4th choice	D	A	C	A	C

88) Which candidate wins in the pairwise comparison between candidate A and candidate D?   88) _____

    A) A

    B) Neither - it is a tie.

    C) Cannot be determined from the information given.

    D) D

    E) none of these

    Answer: D

    Explanation: A)
                         B)
                         C)
                         D)
                         E)

89) Using the Borda count method, the winner of the election is   89) _____
   A) A.
   B) B.
   C) C.
   D) D.
   E) none of these

   Answer: B
   Explanation: A)
                  B)
                  C)
                  D)
                  E)

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

Number of voters	15	11	9	6	2
1st choice	A	C	D	B	C
2nd choice	B	B	C	D	D
3rd choice	C	D	B	C	B
4th choice	D	A	A	A	A

90) How many first-place votes are needed for a majority in this election?   90) _____
   A) 22
   B) 15
   C) 20
   D) 43
   E) none of these

   Answer: A
   Explanation: A)
                  B)
                  C)
                  D)
                  E)

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Solve the problem.

91) "If choice X is a winner of an election and, in a reelection, the only changes in the ballots are changes that only favor X, then X should remain a winner of the election." This fairness criterion is called the

    91) _____

    A) monotonicity criterion.

    B) majority criterion.

    C) independence of irrelevant alternatives criterion.

    D) Condorcet criterion.

    E) none of these

Answer: A

Explanation: A)

                 B)

                 C)

                 D)

                 E)

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

Number of voters	27	24	2
1st choice	A	B	C
2nd choice	C	C	B
3rd choice	B	A	A

92) Which fairness criterion is violated in this election using the Borda count method if candidate B drops out of the election and a reelection is held?

    92) _____

    A) Condorcet criterion

    B) majority criterion

    C) monotonicity criterion

    D) independence-of-irrelevant-alternatives criterion

    E) none of these

Answer: D

Explanation: A)

                 B)

                 C)

                 D)

                 E)

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

Number of voters	51	48	5
1st choice	A	D	E
2nd choice	B	C	C
3rd choice	C	B	D
4th choice	D	A	B
5th choice	E	E	A

93) How many people voted in the election?　　　　　　　　　　　　　　　　93) _____
    A) 51
    B) 5
    C) 3
    D) 104
    E) none of these

Answer: D
Explanation: A)
                B)
                C)
                D)
                E)

For an election with 6 candidates (A, B, C, D, E, and F), we have the following preference schedule:

Number of Voters	41	10	10	15	5
1st choice	B	F	A	A	E
2nd choice	A	A	E	F	F
3rd choice	D	E	F	E	A
4th choice	F	C	D	D	B
5th choice	E	D	C	B	D
6th choice	C	B	B	C	C

94) Using the plurality-with-elimination method, the winner of the election is　　94) _____
    A) A.
    B) B.
    C) C.
    D) E.
    E) none of these

Answer: B
Explanation: A)
                B)
                C)
                D)
                E)

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

Number of voters	20	14	8	7	2
1st choice	A	C	D	C	D
2nd choice	B	B	B	D	A
3rd choice	C	D	A	B	B
4th choice	D	A	C	A	C

95) Using the plurality method, the winner of the election is   95) _____

     A) A.

     B) B.

     C) C.

     D) D.

     E) none of these

Answer: C

Explanation: A)

                      B)

                      C)

                      D)

                      E)

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

Number of Voters	27	19	8	15	2
1st Choice	B	A	D	C	A
2nd Choice	D	D	C	A	C
3rd Choice	A	C	A	D	D
4th Choice	C	B	B	B	B

96) In this election,   96) _____

     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 these

Answer: A

Explanation: A)

                      B)

                      C)

                      D)

                      E)

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

Number of voters	20	14	8	7	2
1st choice	A	C	D	C	D
2nd choice	B	B	B	D	A
3rd choice	C	D	A	B	B
4th choice	D	A	C	A	C

97) Using the plurality ranking method, which candidate comes in last?　　　　　　97) ＿＿＿＿

    A) A

    B) B

    C) C

    D) D

    E) none of these

Answer: B

Explanation:　A)

              B)

              C)

              D)

              E)

Solve the problem.

98) In an election involving 5 candidates, what is the maximum number of columns possible in the　　98) ＿＿＿＿
preference schedule?

    A) 5

    B) 25

    C) 120

    D) 10

    E) none of these

Answer: C

Explanation:　A)

              B)

              C)

              D)

              E)

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

Number of Voters	27	19	8	15	2
1st Choice	B	A	D	C	A
2nd Choice	D	D	C	A	C
3rd Choice	A	C	A	D	D
4th Choice	C	B	B	B	B

99) Using the plurality ranking method, which candidate comes in last?   99) _____

    A) A

    B) B

    C) C

    D) D

    E) none of these

Answer: D

Explanation: A)

                  B)

                  C)

                  D)

                  E)

For an election with 6 candidates (A, B, C, D, E, and F), we have the following preference schedule:

Number of Voters	41	10	10	15	5
1st choice	B	F	A	A	E
2nd choice	A	A	E	F	F
3rd choice	D	E	F	E	A
4th choice	F	C	D	D	B
5th choice	E	D	C	B	D
6th choice	C	B	B	C	C

100) How many people voted in the election?   100) _____

    A) 5

    B) 6

    C) 81

    D) 41

    E) none of these

Answer: C

Explanation: A)

                  B)

                  C)

                  D)

                  E)

101) Using the pairwise comparisons method, there is a candidate that loses every pairwise comparison between itself and the other candidates. That candidate is

101) ____

A) C.
B) D.
C) E.
D) F.
E) none of these

Answer: A

Explanation: A)
B)
C)
D)
E)

Solve the problem.

102) An election involving 6 candidates and 20 voters is held and the results of the election are to be determined using the Borda count method. The maximum number of points a candidate can receive is

102) ____

A) 15 points
B) 20 points
C) 60 points.
D) 120 points.
E) none of these

Answer: D

Explanation: A)
B)
C)
D)
E)

103) The student body at Hickory Middle School is voting for which new food item should be added to the school's cafeteria menu. The choices are Turkey Club (TC), Popcorn Shrimp (PS), BBQ Ribwich (BR), and Tofu Stir fry (TS). The following table gives the preference schedule for the results of the vote.

103) ____

Number of voters	57	34	19	12	10
1st choice	PS	BR	TS	TC	TS
2nd choice	TC	PS	BR	BR	TC
3rd choice	BR	TS	TC	PS	BR
4th choice	TS	TC	PS	TS	PS

Suppose that the voting rules are that when there is a food item with a majority of votes, it is the winner. Otherwise, all candidates with 20% or less of the first-place votes are eliminated and the votes are recounted. Find the preference schedule for the recount.

A)

	67	53	12
1st choice	TC	BR	TC
2nd choice	BR	TS	BR
3rd choice	TS	TC	TS

B)

	57	46	29
1st choice	PS	BR	TS
2nd choice	BR	PS	PS
3rd choice	TS	TS	BR

C)

	57	44	31
1st choice	PS	BR	TC
2nd choice	TC	PS	BR
3rd choice	BR	TC	PS

D)

	57	46	29
1st choice	PS	BR	TS
2nd choice	BR	PS	BR
3rd choice	TS	TS	PS

E)

	57	34	22	19
1st choice	PS	BR	TC	BR
2nd choice	TC	PS	BR	TC
3rd choice	BR	TC	PS	PS

Answer: D

Explanation: A)
　　　　　　　B)
　　　　　　　C)
　　　　　　　D)
　　　　　　　E)

104) The Mathematics Society is holding an election for the president. The three candidates are A, B, and C. Forty-five percent of voters like A the most and B the least. Thirty percent of voters like B the most and C the least. Twenty-five percent of voters like C the most and A the least. Write out the preference schedule for this election.

104) _____

A)

	45	30	25
1st choice	A	B	C
2nd choice	C	A	A
3rd choice	B	C	B

B)

	45	30	25
1st choice	A	B	C
2nd choice	B	A	B
3rd choice	C	C	A

C)

	45	30	25
1st choice	A	B	C
2nd choice	C	A	B
3rd choice	B	C	A

D)

	45	30	25
1st choice	C	A	A
2nd choice	B	B	C
3rd choice	A	C	B

E)

	45	30	25
1st choice	B	C	A
2nd choice	A	A	B
3rd choice	C	B	C

Answer: C

Explanation: A)
B)
C)
D)
E)

1) B
2) B
3) C
4) A
5) C
6) C
7) A
8) B
9) C
10) D
11) C
12) D
13) C
14) C
15) B
16) C
17) D
18) E
19) D
20) B
21) A
22) B
23) B
24) B
25) B
26) A
27) D
28) A
29) B
30) A
31) B
32) B
33) E
34) B
35) A
36) A
37) C
38) D
39) C
40) D
41) A
42) D

43) E
44) A
45) A
46) B
47) D
48) B
49) C
50) D
51) A
52) A
53) B
54) D
55) C
56) D
57) B
58) C
59) D
60) B
61) A
62) C
63) A
64) A
65) B
66) D
67) C
68) B
69) A
70) D
71) B
72) E
73) B
74) B
75) C
76) C
77) D
78) C
79) C
80) A
81) A
82) D
83) C
84) A

85) D
86) B
87) C
88) D
89) B
90) A
91) A
92) D
93) D
94) B
95) C
96) A
97) B
98) C
99) D
100) C
101) A
102) D
103) D
104) C