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

Identify the standard form of the argument.

1) \( p \rightarrow q \)
   \( q \rightarrow r \)
   \( \therefore p \rightarrow r \)
   
   A) Law of Contraposition  
   B) Fallacy of the Converse  
   C) Fallacy of the Inverse  
   D) Law of Syllogism

2) \( p \rightarrow q \)
   \( q \)
   \( \therefore p \)
   
   A) Fallacy of the Converse  
   B) Disjunctive Syllogism  
   C) Law of Contraposition  
   D) Fallacy of the Inverse

3) \( p \rightarrow q \)
   \( \sim p \)
   \( \therefore \sim q \)
   
   A) Fallacy of the Converse  
   B) Fallacy of the Inverse  
   C) Law of Syllogism  
   D) Law of Contraposition

4) \( p \rightarrow q \)
   \( p \)
   \( \therefore q \)
   
   A) Fallacy of the Converse  
   B) Law of Contraposition  
   C) Fallacy of the Inverse  
   D) Law of Detachment

5) \( p \vee q \)
   \( \sim p \)
   \( \therefore q \)
   
   A) Law of Syllogism  
   B) Disjunctive Syllogism  
   C) Fallacy of the Inverse  
   D) Fallacy of the Converse

6) \( p \rightarrow q \)
   \( \sim q \)
   \( \therefore \sim p \)
   
   A) Fallacy of the Converse  
   B) Law of Syllogism  
   C) Fallacy of the Inverse  
   D) Law of Contraposition
7) Using the following graph, find an Euler path that starts with vertex E.

A) E → D → A → C → B → A → F → E → B
B) E → D → A → B → C → A → F
C) E → F → A → B → C → A → D → E
D) No Euler path exists.

8) Using the following graph, find an Euler circuit that begins and ends with vertex A.

A) No Euler circuit exists.
B) A → B → C → D → E → F → A → D → E
C) A → B → C → D → E → F → A → D → E → A
D) A → B → C → D → E → F → A
Solve the problem.

9) The following map shows the states Idaho, Montana, Wyoming, Colorado, Utah, and Nevada. Find a route that starts and ends in Colorado and crosses each common state border exactly one time.

A) CO → WY → ID → MT → WY → ID → UT → CO
B) CO → UT → NV → ID → MT → WY → ID → UT → WY → CO
C) No such route exists.
D) CO → WY → MT → ID → NV → UT → CO

Give an appropriate answer.

10) Using the following graph, find an Euler path that starts with vertex D.

A) No Euler path exists.
B) D → C → E → A → B → C → D
C) D → A → B → C → E → A → B → C → E → D
D) D → E → A → D → C → A → B → C → E
Solve the problem.

11) The map shows the states New Mexico, Oklahoma, Texas, Arkansas, and Louisiana. Find a route that starts in Texas and crosses each common state border exactly one time.

A) No such route exists.
B) TX → LA → AR → TX → OK → NM → TX
C) TX → NM → OK → AR → LA → TX
D) TX → LA → AR → TX → OK → AR → TX → NM → OK

Give an appropriate answer.

12) Using the following graph, find an Euler circuit that begins and ends with vertex A.

A) No Euler circuit exists.
B) A → B → C → D → E → A → C → E → B → D
C) A → B → C → D → E → A → C → E → B → D → A
D) A → B → C → D → E → A
Solve the problem.

13) The map shows the states New Mexico, Oklahoma, Texas, Arkansas, and Louisiana. Find a route that starts in Arkansas and crosses each common state border exactly one time.

A) AR → TX → NM → OK → TX → LA
B) AR → OK → NM → TX → AR → LA → TX → OK
C) AR → LA → TX → NM → OK → AR
D) No such route exists.

14) Using the floor plan below, find a path that starts in room A and passes through each doorway exactly one time.

A) A → D → E → C → B
B) No such path exists.
C) A → D → E → C → A
D) A → C → E → D → A → C → B

Give an appropriate answer.

15) Using the following graph, find an Euler circuit that begins and ends with vertex A.

A) A → B → C → D → E → A → B
B) No Euler circuit exists.
C) A → B → C → D → B → E → A
D) A → B → C → D → B → A
16) Using the following graph, find an Euler path that starts with vertex A.

A) No Euler path exists.  
B) A → C → D → A → B → D  
C) B → A → D → C  
D) A → B → D → C

Solve the problem.

17) Using the following floor plan, find a path that begins and ends in room A and passes through each doorway exactly once.

A) A → D → C → A → B  
B) A → D → C → A → B → D → A  
C) No such route exists.  
D) A → B → A → C → D → A

18) The map shows the states Tennessee, Alabama, Georgia, and Mississippi. Find a route that starts in Mississippi and crosses each common state border exactly one time.

A) MS → TN → AL → MS → GA  
B) MS → AL → TN → GA → MS → TN  
C) MS → TN → GA → MS → TN → AL  
D) No such route exists.
Give an appropriate answer.

19) Using the following graph, find an Euler path that starts with vertex B.

A) B → A → C → D
B) No Euler path exists.
C) B → A → D → C
D) B → A → D → C → A → B

20) Using the following graph, find an Euler circuit that begins and ends with vertex A.

A) A → B → D → E → C → A
B) A → D → B → A → C → E → D → C → A
C) A → B → D → C → E → D → A
D) No Euler circuit exists.

21) Using the following graph, find an Euler path that starts with vertex A.

A) No Euler path exists.
B) A → B → C → D → E → F → G → H
C) A → D → C → H → F → G → H → E → A → B → C
D) A → B → C → D → A → E → F → G → H → F → E
Solve the problem.

22) The following map shows the states Kentucky, Tennessee, Missouri, Iowa, and Nebraska. Find a route that starts and ends in Missouri and crosses each common state border exactly one time.

A) MO → KY → TN → MO → IA → NE  
B) MO → NE → IA → MO → TN → KY  
C) MO → KY → TN → MO → IA → NE → MO  
D) No such route exists.

Give an appropriate answer.

23) Using the following graph, find an Euler path that starts with vertex B.

A) B → A → D → E → C  
B) No Euler path exists.  
C) B → E → D → A → C → E → D  
D) B → A → D → E → B → C → A → E → C → D
Solve the problem.

24) Using the following floor plan, find a path that begins and ends in room F and passes through each doorway exactly once.

![Floor Plan](image1.jpg)

A) F → E → G → B → C → D → G → A  
B) No such route exists.
C) F → A → G → D → C → B → G → A → F  
D) F → A → G → B → C → D → G → E → F

25) Using the floor plan below, find a path that starts in room B and passes through each doorway exactly one time.

![Floor Plan](image2.jpg)

A) No such path exists.  
B) B → C → A → D → E → C
C) B → C → A → D → E  
D) B → C → A → D → E → C → B

26) The following map shows the states Illinois, Indiana, Kentucky, West Virginia, and Virginia. Find a route that starts and ends in Virginia and crosses each common state border exactly one time.

![Map](image3.jpg)

A) VA → KY → IL → IN → KY → VA → WV → KY  
B) VA → WV → KY → IL → IN → KY
C) No such route exists.  
D) VA → WV → KY → IN → IL → KY → VA
Give an appropriate answer.

27) Using the following graph, find an Euler circuit that begins and ends with vertex C.

A) C → D → A → E → F → A → B → C
B) C → D → A → E → F → A → B → C → D
C) No Euler circuit exists.
D) C → D → A → E → F → A → B

28) Using the following graph, find an Euler circuit that begins and ends with vertex B.

A) B → A → F → E → D → C → B
B) B → C → D → E → F → A → B → D → F → B
C) B → C → D → E → F → A → B → C → D → B → F → D → B
D) No Euler circuit exists.
Solve the problem.

29) Use Fleury's algorithm to find an Euler circuit for the following graph.

30) Use Fleury's algorithm to find an Euler circuit for the following graph.
31) Use Fleury’s algorithm to find an Euler circuit for the following graph.

![Graph](image)

Create a graph with the given properties.

32) Six odd vertices

33) Two even and four odd vertices

Solve the problem.

34) Use Fleury’s algorithm to find an Euler path for the following graph.

![Graph](image)
35) Give an example of each of the following on the graph: odd vertex; even vertex; bridge; loop; circuit; a vertex of degree 5.

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

Construct a truth table for the statement.

36) \((q \land w) \land (\neg w \lor t)\)

<table>
<thead>
<tr>
<th>A) q</th>
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<th>B) q</th>
<th>w</th>
<th>t</th>
<th>((q \land w) \land (\neg w \lor t))</th>
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Write the compound statement in words.

37) Let \(r\) = "The puppy is trained."
\(p\) = "The puppy behaves well."
\(q\) = "His owners are happy."
\((r \land p) \rightarrow q\)
A) If the puppy is trained or the puppy behaves well, then his owners are happy.
B) If the puppy is trained and the puppy behaves well, then his owners are happy.
C) The puppy is trained and the puppy behaves well if his owners are happy.
D) If the puppy is trained, then the puppy behaves well and his owners are happy.

Convert the compound statement into words.

38) \(p\) = "People buy large houses."
\(q\) = "Fossil fuels pollute the air."
\(q \land p\)
A) It is not the case that fossil fuels pollute the air and people buy large houses.
B) People buy large houses and fossil fuels do not pollute the air.
C) Fossil fuels pollute the air or people buy large houses.
D) Fossil fuels pollute the air and people buy large houses.
Determine the truth value for each simple statement. Then, using the truth values, give the truth value of the compound statement.

39) $7 < 10$ or $8 > 4$, and $9 < 10$
A) True  B) False

Use DeMorgan's laws or a truth table to determine whether the two statements are equivalent.
40) $(p \lor q) \land r$, $p \lor (q \land r)$
A) Not equivalent  B) Equivalent

Use the method of writing each premise in symbols in order to arrive at a valid conclusion.
41) Every man with a mind can think.
   A distracted man can't think.
   A man who is not distracted can apply himself.
   Therefore, ...
   A) Every man who can apply himself has a mind.
   B) Every distracted man can apply himself.
   C) Every man with a mind is distracted.
   D) Every man with a mind can apply himself.

Determine if the argument is valid or invalid. Give a reason to justify answer.
42) If the bough breaks, then the cradle will fall.
   The bough breaks.
   $\therefore$ The cradle will fall.
   A) Invalid by fallacy of the converse  B) Valid by the law of detachment
   C) Invalid by fallacy of the inverse  D) Valid by the law of syllogism

Construct a truth table for the statement.
43) $\neg s \land \neg r$
A) $s$, $r$ ($\neg s \land \neg r$)
   T  T  F
   T  F  F
   F  T  F
   F  F  T
C) $s$, $r$ ($\neg s \land \neg r$)
   T  T  T
   T  F  F
   F  T  T
   F  F  T

Write the compound statement in words.
44) Let $r$ = "The puppy is trained."
   p = "The puppy behaves well."
   q = "His owners are happy."
   $r \rightarrow (p \land q)$
   A) The puppy is trained and the puppy behaves well if his owners are happy.
   B) The puppy is trained, the puppy behaves well, and his owners are happy.
   C) If the puppy is trained, then the puppy behaves well and his owners are happy.
   D) If the puppy is trained and the puppy behaves well, then his owners are happy.
Write the compound statement in symbols. Then construct a truth table for the symbolic statement.
Let \( r = "The food is good," \) \( p = "I eat too much," \) and \( q = "I'll exercise." \)

45) If I exercise, then I won't eat too much.

\[
\begin{array}{cc}
A) & \sim(p \implies q) \\
\hline
p & q & \sim(p \implies q) \\
T & T & F \\
T & F & T \\
F & T & F \\
F & F & F \\
\end{array}
\]

46) If the food is not good, I won't eat too much.

\[
\begin{array}{cc}
A) & \sim(q \implies r) \\
\hline
r & p & \sim(q \implies r) \\
T & T & F \\
T & F & T \\
F & T & F \\
F & F & T \\
\end{array}
\]

Let \( p \) represent the statement, "Jim plays football", and let \( q \) represent "Michael plays basketball". Convert the compound statements into symbols.

47) Jim plays football and Michael plays basketball.

\[
\begin{array}{cc}
A) & p \lor q \\
B) & \sim p \land q \\
C) & p \lor \sim q \\
D) & p \land q \\
\hline
r & p \lor q \\
T & T \\
T & F \\
F & T \\
F & F \\
\end{array}
\]
Solve the problem.

48) The map shows the states Tennessee, Alabama, Georgia, and Mississippi. Is it possible to find a route that starts in Mississippi and crosses each common state border exactly one time?

A) No
B) Yes

Identify any bridges in the graph or say there are none.

49) 

A) AB and AD
B) None
C) AB, AC, AD, and BC
D) AD
Represent the following with a graph.

Determine whether the graph is connected or disconnected.

A) Connected

B) Disconnected
Write an equivalent sentence for the statement.

52) It is false that cats are lazy or dogs are not friendly. (Hint: Use De Morgan's laws.)
   A) Cats are lazy and dogs are friendly.       B) Cats are not lazy and dogs are friendly.
   C) Cats are not lazy or dogs are friendly.       D) Cats are not lazy or dogs are not friendly.

Use DeMorgan's laws or a truth table to determine whether the two statements are equivalent.

53) \( \sim(p \lor q) \rightarrow r, (\sim p \land \sim q) \rightarrow r \)
   A) Not equivalent       B) Equivalent

Determine whether the argument is valid or invalid.

54) If I hear that poem, it reminds me of my mother. If I get sentimental, then it does not remind me of my mother. I get sentimental. Therefore, I don't hear that poem.
   A) Invalid       B) Valid

Determine which, if any, of the three statements are equivalent.

55) I) The raft flipped if and only if the guide misjudged the rapid or the crew fell overboard.
    II) The crew fell overboard, or if the guide misjudged the rapid then the raft flipped.
    III) If the guide misjudged the rapid, then the raft flipped or the crew fell overboard.
   A) II and III are equivalent       B) I, II and III are equivalent
   C) I and II are equivalent       D) None are equivalent

Identify any bridges in the graph or say there are none.

56) A) BI, EI, and FH       B) AE, AB, and AC
    C) EI and FH       D) None
Answer Key
Testname: TEST3_REVIEW

1) D
2) A
3) B
4) D
5) B
6) D
7) A
8) A
9) B
10) D
11) A
12) C
13) B
14) B
15) C
16) B
17) D
18) B
19) B
20) D
21) A
22) C
23) D
24) D
25) B
26) D
27) A
28) B
29) Answers may vary. One possibility is: A → B → C → D → E → F → G → H → I → J → A → H → C → F → A
30) Answers may vary. One possibility is: A → B → C → D → E → F → C → A → I → H → G → I → F → A
31) Answers may vary. One possibility is: C → A → B → F → D → C → F → E → C
32) Answers will vary. One possibility is:
33) Answers will vary. One possibility is:

![Graph Image]

34) Answers may vary. One possibility is: $B \rightarrow E \rightarrow C \rightarrow F \rightarrow E \rightarrow H \rightarrow G \rightarrow E \rightarrow D \rightarrow A \rightarrow E$

35) odd vertex: C, D, E, or F
   even vertex: A, B, G, or H
   bridge: edge CF, edge CD, or edge CE
   loop: edge AA
   circuit: ABCA or FGHF
   vertex of degree 5: vertex C

36) A
37) B
38) D
39) A
40) B
41) D
42) B
43) A
44) C
45) B
46) D
47) D
48) B
49) D
50) C
51) B
52) B
53) B
54) B
55) A
56) A