1. "Ralph Nader was the best candidate for president, because he was totally better than all the others." Select the most suitable fallacy type.
   A) limited choice
   B) circular reasoning
   C) hasty generalization
   D) false cause

2. "I've met three race drivers today and they all were rather aggressive. Clearly, all race drivers are aggressive." Select the most suitable fallacy type.
   A) appeal to emotion
   B) slippery slope
   C) hasty generalization
   D) limited choice

3. Which of the graphs below are connected?

   ![Graph I](image1.png)
   ![Graph II](image2.png)

   A) I only
   B) II only
   C) Both I and II
   D) Neither I nor II
4. Which of the graphs below have Euler circuits?

A) I only  
B) II only  
C) Both I and II  
D) Neither I nor II

5. Every graph that has an Euler circuit is connected.
   A) False   
   B) True

6. For which of the two situations below is it desirable to find an Euler circuit or an efficient eulerization of a graph?
   I. A street department employee must check the traffic signals at each intersection in a downtown area to be certain they are working.
   II. An employee of a power company reads the electric meters outside each house along the streets in a residential area.
   A) I only  
   B) II only  
   C) Both I and II  
   D) Neither I nor II
7. Consider the path represented by the numbered sequences of edges in the graph below. Which path represents an Euler circuit?

A) I only
B) II only
C) Both I and II
D) Neither I nor II
8. The map shown below illustrates part of a postal carrier's territory. The dots indicate mailboxes to which mail must be delivered. Which graph would be most useful for finding an efficient route for mail delivery?

![Map of a postal carrier's territory with dots indicating mailboxes.]

- a. 
- b. 
- c. 
- d. 

Page 4
9. Which of the graphs shown below gives the best eulerization of the given graph. (In the graphs below, added edges are denoted with zig-zag lines.)

a.  

b.  

c.  

d.  

10. A college student has six pairs of pants, eight tee shirts, three sweatshirts and two pairs of tennis shoes. If an outfit consists of pants, a tee shirt, a sweatshirt, and a pair of tennis shoes, how many different outfits can the student wear before repeating one?

A) 124  
B) 328  
C) 19  
D) 288  

\[6 \cdot 8 \cdot 3 \cdot 2\]
11. For the graph below, what is the cost of the Hamiltonian circuit obtained by using the nearest-neighbor algorithm, starting at A?

\[4 + 2 + 1 + 5 + 9 + 8 =\]

A) 28  
B) 35  
C) 25  
D) 29

12. For the graph below, what is the cost of the Hamiltonian circuit obtained by using the sorted-edges algorithm?

\[1 + 2 + 4 + 5 + 8 + 9\]

A) 33  
B) 41  
C) 29  
D) 23
13. Use Kruskal's algorithm for minimum-cost spanning trees on the graph below. What is the cost of the tree found?

A) 39  
B) 27  
C) 31  
D) 35  

14. The path produced by the nearest-neighbor algorithm when solving the traveling salesman problem may be dependent on the starting city.
A) False  
B) True

15. Suppose a maintenance worker needs to empty garbage dumpsters from five locations on the grounds of a park in the most efficient way possible. The technique most likely to be useful in solving this problem is
A) applying Kruskal's algorithm for finding a minimum-cost spanning tree for a graph.  
B) finding an Euler circuit on a graph. 
C) applying the nearest-neighbor algorithm for the traveling salesman problem. 
D) None of these techniques is likely to apply.
16. What is the earliest possible completion time for a job whose order-requirement is shown below?

\[ \begin{array}{ccc}
T_1 & T_2 & T_3 \\
10 & 3 & 5 \\
\end{array} \]

\[ \begin{array}{ccc}
T_4 & T_5 & T_6 \\
7 & 13 & 17 \\
\end{array} \]

(A) 17  
(B) 15  
(C) 10  
(D) 40

17. The minimum-cost spanning tree produced by applying Kruskal's algorithm may contain the most expensive edge of the graph.

(A) False  
(B) True

18. Suppose that a crew can currently complete in a minimum amount of time the job whose order-requirement digraph is shown below. If Task T_6 is shortened from 7 minutes to 4 minutes, then what is the maximum amount by which the completion time of the entire job can be shortened?

\[ \begin{array}{ccc}
T_1 & T_2 & T_3 \\
7 & 9 & 5 \\
\end{array} \]

\[ \begin{array}{ccc}
T_4 & T_5 & T_6 \\
8 & 6 & 10 \\
\end{array} \]

(A) It cannot be reduced.  
(B) 1 minute  
(C) 2 minutes  
(D) 3 minutes
19. Given the order-requirement digraph below (with time given in minutes) and the priority list $T_1$, $T_2$, $T_3$, $T_4$, $T_5$, $T_6$, apply the list-processing algorithm to construct a schedule using two processors. How much time does the resulting schedule require?

A) 24 minutes
B) 21 minutes
C) 22 minutes
D) 23 minutes

20. Given the order-requirement digraph below (with time given in minutes) apply the critical-path scheduling algorithm to construct a priority list, (break ties by choosing task with lower subscript).

Then the priority list would be:
A) $T_5 T_1 T_2 T_3 T_6 T_7$
B) $T_2 T_1 T_3 T_5 T_6 T_7$
C) $T_1 T_2 T_3 T_4 T_5 T_6 T_7$
D) $T_7 T_6 T_5 T_4 T_3 T_2 T_1$

21. Use the decreasing-time-list algorithm to schedule these tasks on two machines:
3 minutes, 5 minutes, 8 minutes, 4 minutes, 6 minutes, 2 minutes

How much time does the resulting schedule require?
A) 16 minutes
B) 14 minutes
C) 18 minutes
D) 15 minutes
22. Choose the packing that results from the use of the worst fit (WF) bin-packing algorithm to pack the following weights into bins that can hold no more than 8 lbs.

- 5 lbs, 7 lbs, 1 lb, 2 lbs, 4 lbs, 5 lbs, 1 lb, 1 lb, 3 lbs, 6 lbs, 2 lbs

23. Find the chromatic number of the graph below:

- A) 3
- B) 2
- C) 4
- D) 6

24. Write the resource constraints for this situation: A small stereo manufacturer makes a receiver and a CD player. Each receiver takes 8 hours to assemble and 1 hour to test and ship. Each CD player takes 15 hours to assemble and 2 hours to test and ship. The profit on each receiver is $30 and the profit on each CD player is $50. There are 160 hours available in the assembly department and 22 hours available in the testing and shipping department.

- A) $8x + 15y \leq 160, \ x + 2y \leq 22, \ x \geq 0, \ y \geq 0$
- B) $8x + 1y \leq 30, \ 15x + 2y \leq 50, \ x \geq 0, \ y \geq 0$
- C) $8x + 1y \leq 160, \ 15x + 2y \leq 22, \ x \geq 0, \ y \geq 0$
- D) $8x + 15y \leq 30, \ x + 2y \leq 50, \ x \geq 0, \ y \geq 0$
25. Graph the feasible region identified by the inequalities:

\[ 5x + 1y \leq 10 \]
\[ 3x + 3y \leq 18 \]
\[ x \geq 0, y \geq 0 \]

![Graph of feasible region](image)

\[ \frac{5x + y \leq 10}{\begin{array}{c} x = 0 \quad 5x + y \leq 10 \\ y = 0 \quad 5x + 0 \leq 10 \end{array}} \]
\[ \quad (0, 10) \]
\[ \frac{3x + 3y \leq 18}{\begin{array}{c} x = 0 \quad 3x + 3y \leq 18 \\ y = 0 \quad 3x + 3 \cdot 0 \leq 18 \end{array}} \]
\[ \quad (0, 6) \]

26. Find the point of intersection of the lines whose equations are \( x + 3y = 18 \) and \( 2x + y = 11 \).

A) \((5, 3)\)
B) \((2, 3)\)
C) \((3, 2)\)
D) \((3, 5)\)

\[ \begin{align*}
\begin{cases}
x + 3y = 18 \\
2x + y = 11
\end{cases}
\end{align*} \]

\[ \begin{align*}
\text{Eq. (1) - Eq. (2): } & \quad 0 + 5y = 25 \\
\implies & \quad y = 5
\end{align*} \]

\[ \begin{align*}
\text{Multiply Eq. (2): } & \quad 2x + 5 = 11 \\
\implies & \quad x = 3
\end{align*} \]

27. Suppose the feasible region has five corners, at these points: \((1, 1)\), \((1, 7)\), \((5, 7)\), \((5, 5)\), and \((4, 3)\). If the profit formula is \$5x - \$2y\), which point maximizes the profit?

A) \((5, 7)\)
B) \((4, 3)\)
C) \((1, 7)\)
D) \((5, 5)\)

\[ \begin{align*}
P(1, 1) = 5 \cdot 1 - 2 \cdot 1 = 3, & \quad P(1, 7) = 5 \cdot 1 - 2 \cdot 7 = -9
\end{align*} \]

\[ \begin{align*}
P(5, 7) = 5 \cdot 5 - 2 \cdot 7 = 11, & \quad P(5, 5) = 5 \cdot 5 - 2 \cdot 5 = 15
\end{align*} \]

28. Find an initial solution using the Northwest Corner Rule and compute its cost.

<table>
<thead>
<tr>
<th>Bakery 1</th>
<th>Shop 1</th>
<th>Shop 2</th>
<th>Shop 3</th>
<th>Shop 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bakery 2</td>
<td>2 3</td>
<td>1 1</td>
<td>0 2</td>
<td>x 0</td>
</tr>
</tbody>
</table>

\[ \text{ rim conditions} \]

\[ \text{Pay}\ 11 \]

\[ \text{cont. } 2 \cdot 3 + 1 \cdot 1 + 0 \cdot 2 + 0 \cdot 1 + 3 \cdot 5 + 4 \cdot 4 = 38 \]