1. The organizers of a short-term art exhibition are preparing to set up several displays along the walkways of a public park. The displays will be arranged so that they can all be viewed while walking in either direction on the walkway.

Suppose the edges in the graph below represent the existing walkways in the park.

What do the vertices in the graph represent?

What does the degree (or valence) of a vertex represent in this graph?

The goal of organizers is for visitors to be able to view the displays on all the walkways, returning to their initial starting place. In graph terminology, what is this goal equivalent to? Is it possible to accomplish this goal utilizing only the existing walkways?

Organizers have permission to construct a limited number of temporary walkways in order to accommodate their goal. How could they accomplish their goal while constructing as few new walkways as possible?
2. The vertex and edge set of a graph is given below. Draw a representation of the graph.

\[ V = \{ M_1, M_2, M_3, M_4, M_5, M_6, M_7, M_8 \} \]
\[ E = \{ \{ M_1, M_3 \}, \{ M_2, M_3 \}, \{ M_2, M_4 \}, \{ M_2, M_5 \}, \{ M_3, M_4 \}, \{ M_4, M_6 \}, \{ M_7, M_8 \} \} \]

What is the degree (or valence) of vertex \( M_2 \)? ______

Does the above graph have an Euler circuit? ______

Does the above graph have a Hamiltonian circuit? ______

3. Write the edge set of the graph below.
For problems 4 and 5, refer to the following graph:

4. Identify an Euler circuit in the graph above (if possible), listing the vertices in the order they are visited. If an Euler circuit is not possible, explain.

5. Identify a Hamiltonian circuit in the graph above (if possible), listing the vertices in the order they are visited.

6. Suppose a graph is constructed whose vertices represent all 48 state capitals in the contiguous United States. If the edges of this graph were assigned weights which measured the mileage between a pair of cities, describe what it would mean to find a least-weight Hamiltonian circuit in the graph.
For problems 7 through 9, refer to the following graph:

7. Construct a Hamiltonian circuit using the Nearest Neighbor Method starting at vertex V.

What is the total weight of the Hamiltonian circuit this method produces? ______

8. Construct a Hamiltonian circuit using the Nearest Neighbor Method starting at vertex T.

What is the total weight of the Hamiltonian circuit this method produces? ______


What is the total weight of the Hamiltonian circuit this method produces? ______