Work on these with your partner(s) at the board

1. Draw a simple graph with the following properties or explain why no such graph exists.
   (a) G has an Euler circuit and has 5 vertices with degrees 4, 4, 2, 2, 2
   (b) G has an Euler circuit and has 6 vertices with degrees 4, 4, 4, 3, 3, 2
   (c) G has an Hamiltonian circuit and has 6 vertices with degrees 4, 4, 4, 3, 3, 2
   (d) G has both a Hamiltonian circuit and an Euler circuit
   (e) G has a Hamiltonian circuit and an Euler circuit that are different from each other

2. Sketch a graph with the given adjacency matrix.

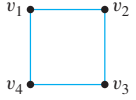
   (a) $\begin{bmatrix} 1 & 2 & 0 \\ 2 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 0 & 1 & 2 \\ 0 & 0 & 1 & 0 \\ 0 & 2 & 1 & 1 \\ 0 & 1 & 1 & 0 \end{bmatrix}$

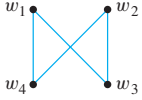
   Note (a) is an undirected graph and (b) is directed

3. Describe the properties of the adjacency matrix of an undirected simple graph.

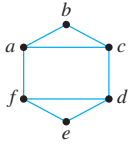
4. For each pair of simple graphs, determine if G and G' are isomorphic.
   If they are, give the function $g : V(G) \to V(G')$. If not isomorphic, prove why not.

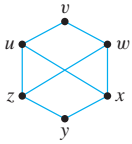
(a)



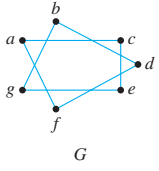


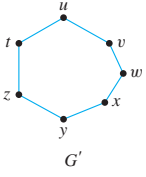
(b)



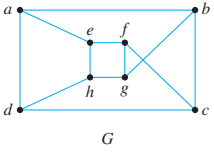


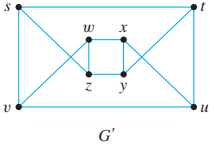
(c)





(d)





Epp, Section 10.4