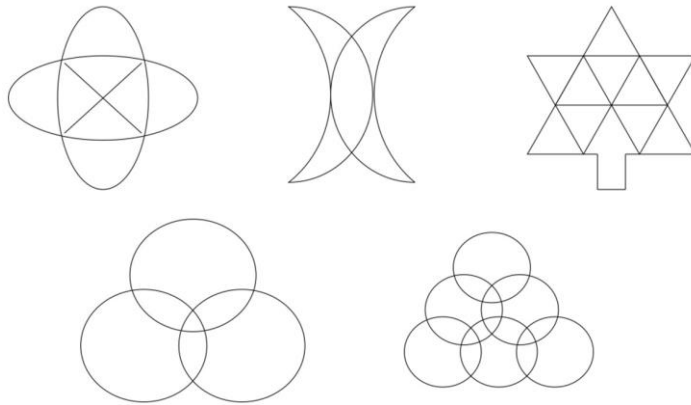


## Assignment 10

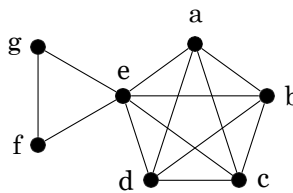
1. Can the following shapes be drawn in one stroke?



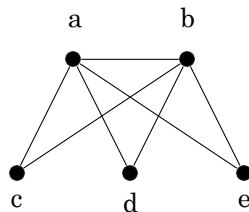
2. Compare the differences between Euler graphs and Hamiltonian graphs.

test

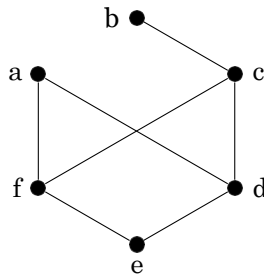
- How many vertices and how many edges do each of the following graphs have?
  - $K_5$
  - $C_4$
  - $W_5$
  - $K_{2,5}$
- Does a simple graph that has five vertices each of degree 3 exist? If so, draw such a graph. If not, explain why no such graph exists.
- How many nonisomorphic simple graphs are there with three vertices? Draw examples of each of these.
- Is there an Euler circuit in the following graph? If so, find such a circuit. If not, explain why no such circuit exists.



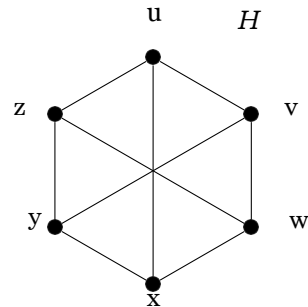
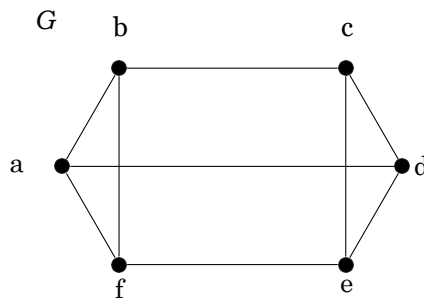
- Is there a Hamilton circuit in the graph shown in problem 4? If so, find such a circuit. If not, prove why no such circuit exists.
- Is the following graph planar? If so draw it without any edges crossing. If it is not, prove that it is not planar.



7. What is the chromatic number of each of the graphs in problem 1? Explain your answers.
8. For each of the following sequences determine whether there is a simple graph whose vertices have these degrees. Draw such a graph if it exists.
- (a) 0, 1, 1, 2
  - (b) 2, 2, 2, 2
  - (c) 1, 2, 3, 4, 5
9. Is the following graph bipartite? Justify your answer.



10. Decide whether the graphs  $G$  and  $H$  are isomorphic. Prove that your answer is correct.



11. Consider the graphs  $K_5$ ,  $K_{2,3}$ , and  $W_5$ . Which of these graphs have an Euler circuit? Which have an Euler path?
12. Which of the graphs in problem 4 are planar?
13. What is the chromatic number of each of the graphs in problem 4?
14. Use Dijkstra's algorithm to find the length of the shortest path between the vertices  $a$  and  $z$  in the following weighted graph.

