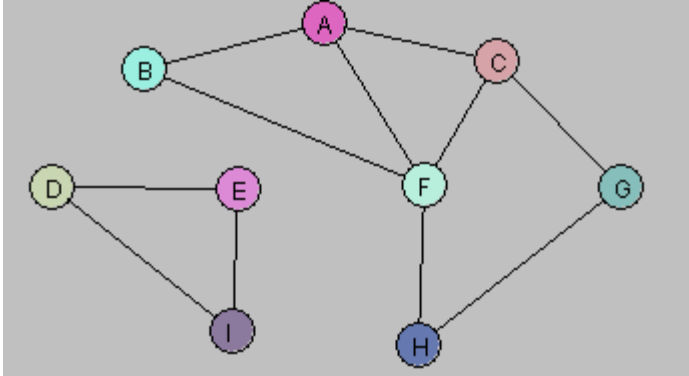


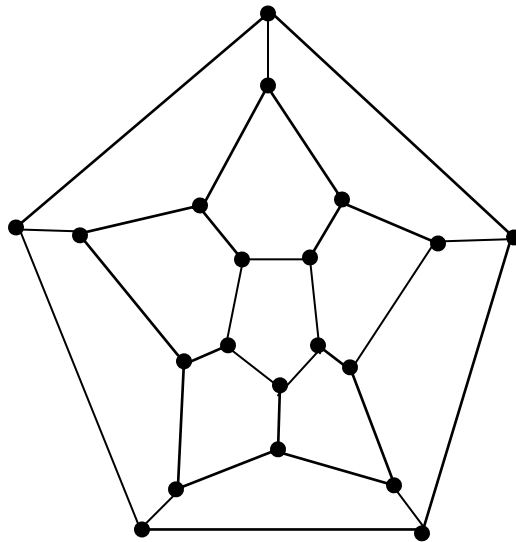
Lab 11

1. Answer questions about the graph $G = (V, E)$ displayed below.



- A. Is the graph G connected? If not, what are the connected components for G?
- B. Draw a spanning tree/forest for G.
- C. Is G a Hamiltonian graph?
- D. Is there a Vertex Cover of size less than or equal to 5 for G? If so, what is the Vertex Cover?

2. *Hamiltonian Graphs.* The following graph has a Hamiltonian cycle. Find it.

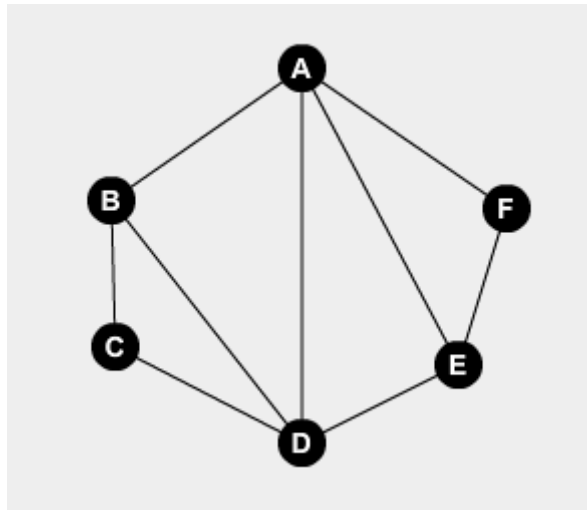


3. *Vertex Covers*. Create an algorithm for computing the smallest size of a vertex cover for a graph. The input of your algorithm is a set V of vertices along with a set E of edges. Assume you have the following functions available (no need to implement these):

- `computeEndpoints(edge)` – returns the vertices that are at the endpoints of the input edge
- `belongsTo(vertex, set)` – returns true if the input vertex is a member of the given set

Hint: Loop through all subsets of V . For each subset W , check to see if W is a vertex cover. Do this by looping through all edges; for each edge e , check to see if at least one of its endpoints lies in W .

4. Compute two spanning trees for the graphs below using algorithms we discuss in class. (You can start with vertex A) Are the two spanning trees same?



5. Write the pseudo-code for compute connected components algorithm discussed in class. Your algorithm can be built on top of DFS discussed in the slides.
6. Write the pseudo-code for the algorithm, discussed in class, that computes the shortest path length between two vertices in a graph. You can assume that:
- a. The graph is connected.
 - b. A version of BFS is provided that accepts a specified starting vertex.