

1 Graph Representation

Represent the graph above with an adjacency list and an adjacency matrix representation.

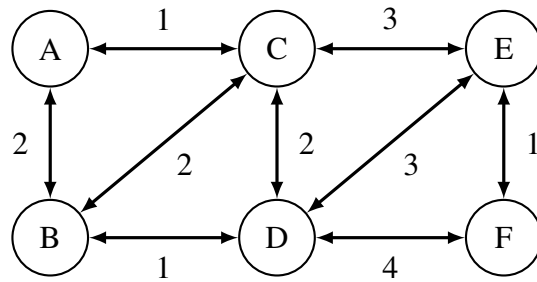
2 Searches and Traversals

Run depth first search (DFS) preorder, DFS postorder, and breadth first search (BFS) on the graph above, starting from node A. List the order in which each node is first visited. Whenever there is a choice of which node to visit next, visit nodes in alphabetical order.

3 Topological Sorting

Give a valid topological ordering of the graph. Is it unique?

4 Minimum Spanning Trees



- (a) Perform Prim's algorithm to find a minimum spanning tree of the graph above. Pick A as the initial node. If there are multiple edges with the same cost, process them in alphabetical order.
- (b) Use Kruskal's algorithm to find a valid minimum spanning tree of the graph above. If there are multiple edges with the same cost, process them in alphabetical order. Will Prim's and Kruskal's always return the same MST?
- (c) Draw the final state of the tree that results from union find operations executed when running Kruskal's on the graph above. When selecting a new root, break ties alphabetically.