22.2-8.

Take any node, and run BFS on the tree and record the last discovered node. Then take that node and perform another BFS. The longest distance obtained is the diameter of the tree.

Runtime Complexity = O(n), n= number of nodes.

22.3-13

Run DFS once from each vertex. The graph is singly connected if and only if there are no forward edges and there are no cross edges within a component. In order to check for forward edges, make sure no finished nodes are encountered while doing DFS. Runtime Complexity = O(|V|(|V| + |E|)).

Why should we run DFS from all the vertices? For example:

The above graph is not singly connected, as there are 2 paths from 1 to 2. One is via 4 and the other is not. However, if we do just 1 DFS starting from 4, it will return that the graph is singly connected.