**Question 1: Binary Tree (Insertion and Deletion)**

**Scenario:** You are tasked with implementing a binary tree to store and manage a collection of book records, where each book has an ID, title, and author. The tree must support insertion and deletion of records.

**Questions:**

1. **Design the binary tree for this task.** Explain the structure of the nodes and how you would implement insertion and deletion operations.
2. **What are the challenges in maintaining the binary tree's properties during deletion, and how would you handle them?**

**Question 2: Binary Search Tree (BST) (Insertion and Deletion)**

**Scenario:** You need to implement a BST for a contact management system, where each contact is identified by a unique phone number. The BST must efficiently support insertion and deletion of contacts.

**Questions:**

1. **How would you design the BST for this contact management system?** Include details on the node structure and the implementation of insertion and deletion operations.
2. **What are the implications of deleting a node in a BST and how would you handle the different cases?**

**Question 3: Tree Traversal (Inorder, Preorder)**

**Scenario:** You need to traverse a binary tree representing organizational hierarchy to generate reports. The tree's nodes represent employees, and the traversal order impacts how the report is generated.

**Questions:**

1. **Explain how you would implement inorder and preorder traversals for this binary tree.** Provide code snippets for each traversal method.
2. **What are the use cases for each traversal method in generating organizational reports?**

**Question 4: Tree Traversal (Postorder, Level Order)**

**Scenario:** You are developing a system to manage file directories represented as a binary tree. You need to generate different types of reports based on file and directory structure.

**Questions:**

1. **Describe the implementation of postorder and level order traversals for this directory tree.** Provide code snippets for each traversal method.
2. **How would these traversals be useful in managing and reporting file directories?**

**Question 5: Graphs (Weighted and Directed Graphs)**

**Scenario:** You are implementing a navigation system that uses a graph to represent cities (nodes) and roads (edges). The graph is both weighted (distance between cities) and directed (one-way roads).

**Questions:**

1. **Describe how you would implement the graph using an adjacency matrix and an adjacency list.** Explain the advantages and disadvantages of each representation.
2. **How would you use these representations to implement basic graph algorithms like finding the shortest path or traversing the graph?**