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Assignment 7 Answers

1. The graph is stored as an unweighted, undirected adjacency matrix.
2. Graph 2 and Graph 3 are connected because there exists a route to every vertex.
3.
 - a. No, the output would not change because the graphs are not directed.
 - b. Yes, the output would change, a route may not exist between the selected vertices, because you can only walk a route in one direction.
4.
 - a. A BFS will generally take more time to find a destination due to the fact that it must go through every vertex, however, it will always find the destination. It will also find the shortest path to the destination, just not always in the least amount of time.
 - i. Used for:
 1. Graphs that may contain infinite loops
 2. Graphs that are wide
 3. Solutions that are rare
 - b. A DFS will generally take less time, but can choose the “incorrect” path and spend time backtracking. A DFS can also get stuck in an infinite loop and may not find the destination. It can find a deep path quickly if it chooses the correct path early.
 - i. Used for:
 1. Graphs that contain frequent solutions
 2. Graphs that are deep, as long as the solution is frequent
5. $O(\text{Number of Vertices} + \text{Number of Edges})$. Since adding and removing from the deque are $O(1)$ for each vertex and edge, and you iterate over each vertex (and each edges at most twice) once to determine the path, the time complexity is how many edges and vertices there are.