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Assignment 7  
Written Answers

1. How is the graph stored in the provided code? Is it represented as an adjacency matrix or list?

The provided code stores the graph in a list. This provides a more memory-efficient way of storing this graph than a matrix. It contains only the edge number instead of the entire array.

2. Which of the 3 graphs are connected? How can you tell?

Graphs 2 and 3 appear to be connected because all of their steps showed paths. Graph 1 contained some vertices without paths.

3. Imagine that we ran each depth-first and breadth-first searches in the other direction (from destination to source). Would the output change at all? Would the output change if the graphs were directed graphs?

The output should not change on an undirected graph. If it was a directed graph, it could change since some vertices might not connect in the reverse direction.

4. What are some pros and cons of DFS vs BFS? When would you use one over the other?

DFS has an issue of only checking a single path until it reaches the end of that path, while BFS is a wave that expands outward. A DFS search could potentially be tripped up by an infinite or extremely lopsided search, while a BFS search would still find the location. I would use a DFS search if I knew there weren't any infinite or lopsidedly heavy paths that it could be tripped up on.

5. What is the Big O execution time to determine if a vertex is reachable from another vertex?

$O(n+m)$  where  $n$  is the number of vertices and  $m$  is the number of edges.