1. (25 pts) Modify Dijkstra’s algorithm so that it checks if a given directed graph \( G = (V,E) \) has a cycle. Give the pseudocode and analyze the performance.

2. (25 pts) Assume that for a given weighted directed graph \( G = (V,E) \), the shortest path from \( s \) to any other vertex contains at most \( m \) edges. Show how to modify the Bellman-Ford algorithm to take advantage of this information. Give the pseudocode.

Extra Credit (10 pts)

How can we use the output of the Floyd-Warshall algorithm to detect the presence of a negative weight cycle?