1. (20 points) CLRS 22.3-11

2. (20 points) CLRS 22.5-2

3. (20 points) Execute Prim’s minimum spanning tree algorithm by hand on the graph shown below, and list the sequence of edges as they become part of the minimum spanning tree.
   a. Start at vertex G.
   b. Start at vertex H.

4. (20 points) CLRS 23-4.

5. (20 points) The adjacency list of a digraph is given as follows. For convenience, the digraph is also shown.

   A: B(4), F(2)
   B: A(1), C(3), D(4)
   C: A(6), B(3), D(7)
   D: A(6), E(2)
   E: D(5)
   F: D(2), E(3)

(Please turn over)
a. This diagraph has three shortest paths from C to E (i.e., all with the same total weight). Find them. (List the sequence of vertices in each path.)

b. Which of these paths is the one that would be found by Dijkstra’s shortest-path algorithm, with vertex C as the source? (Give a convincing explanation or show the main steps of the algorithm.)

c. Execute Dijkstra’s shortest-path algorithm by hand on this graph, showing how the data structures evolve, with vertex A as the source. Clearly indicate which edges become part of the shortest-path tree and in what order.