DS HW11

Deadline: 2018/12/25

手寫題

4. Give the depth-first traversal of the graph in Figure 11-23, starting from vertex A.

6. Draw three spanning trees that can be found in the graph in Figure 11-23.

8. Give the adjacency list representation of the graph in Figure 11-23.

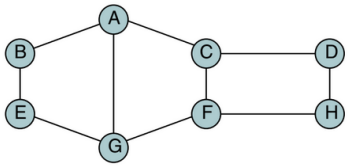

FIGURE 11-23 Graph for Exercises 1 through 8

10. Find the shortest path between node A and all other nodes in the graph in Figure 11-24.

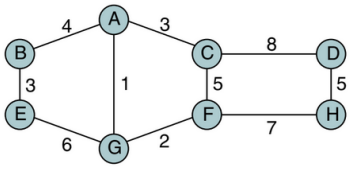

FIGURE 11-24 Graph for Exercises 9 through 12

程式題

22. Write the C code for Algorithm 11-12, "Minimum Spanning Tree of a Graph," using the ADT given in the text.

ALGORITHM 11-12 Minimum Spanning Tree of a Graph

```
Algorithm spanningTree (graph)
Determine the minimum spanning tree of a network.
   Pre  graph contains a network
   Post spanning tree determined
1  if (empty graph)
   1  return
2  end if
3  loop (through all vertices)
      Set inTree flags false.
   1  set vertex inTree flag to false
   2  loop (through all edges)
      1  set edge inTree flag to false
      2  get next edge
   3  end loop
   4  get next vertex
4  end loop
   Now derive spanning tree.
5  set first vertex to in tree
6  set treeComplete to false
7  loop (not treeComplete)
   1  set treeComplete to true
   2  set minEdge to maximum integer
   3  set minEdgeLoc to null
   4  loop (through all vertices)
         Walk through graph checking vertices in tree.
      1  if (vertex in tree AND vertex outDegree > 0)
         1  loop (through all edges)
            1  if (destination not in tree)
                  set destination inTree flag to false)
               1  set treeComplete to false
               2  if (edge weight < minEdge)
                  1  set minEdge to edge weight
                  2  set minEdgeLoc to edge
               3  end if
            2  end if
            3  get next edge
         2  end loop
      2  end if
      3  get next vertex
   5  end loop
   6  if (minEdgeLoc not null)
         Found edge to insert into tree.
      1  set minEdgeLoc  inTree flag to true
      2  set destination inTree flag to true
   7  end if
8  end loop
end spanningTree
```

28. A computer company in the Silicon Valley area (see Figure 11-28) needs to route delivery vehicles between cities on the shortest route. Having studied data structures, you recognize that this is an application for Dijkstra's shortest path algorithm. To demonstrate your proposal, you decide to implement it on your computer. To do so you must complete the following tasks:

    a. Convert the map in Figure 11-28 to a network and present it to management.
    b. Modify the graph ADT to store weights in the arc nodes.
    c. Write an interactive program that when given the start and destination displays the shortest route between them.

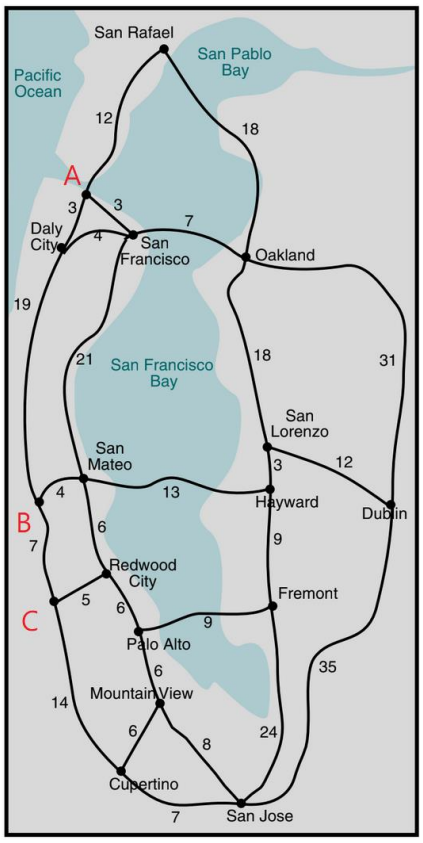

FIGURE 11-28 Map of Silicon Valley Area