國立中山大學 101 學年度第 2 學期資訊工程學系資工數學期末考

2012/06/20

1. Define the Bellman's Minimality Principle (Optimality Principle), and take an example (5%)

2. (a) Use adjacency matrix to express Fig. 1. (10%)

   (b) What is the edge incidence list? (5%)
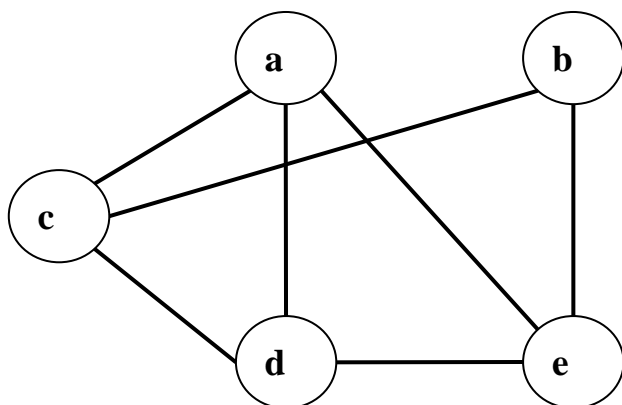
   (c) What is the vertex incidence list? (5%)

Fig. 1

3. What are the "Graph"? "Digraph"? Define them and take an example for each term. (5%)

4. What are the "walk", "trail", "path" and "cycle"? Define them and take an example for each term. (5%)

Note: From Question. 5 to Question. 8, you get "zero" if you only write the answer. You have to show all the steps as examples in textbook.

5. Use Moore's BFS Algorithm to find the shortest path from vertex s to vertex t, and the shortest path's length in Fig.2. Show all the steps, step by step. (10 %)
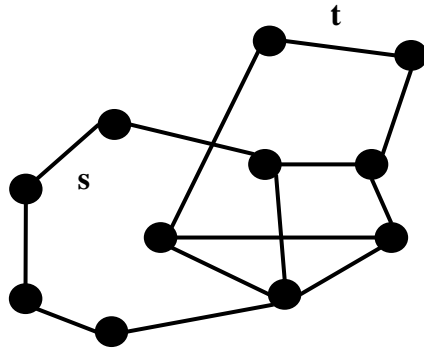

Fig. 2

6. Use Dijkstra's algorithm to solve the Fig. 3 single-source shortest path problem (Show: (I) PL and TL in every step. (II) Show every subgraph in each step.)

   (a). from vertex "a" to vertex "b", "c", "d", "e" and "f".(10%)

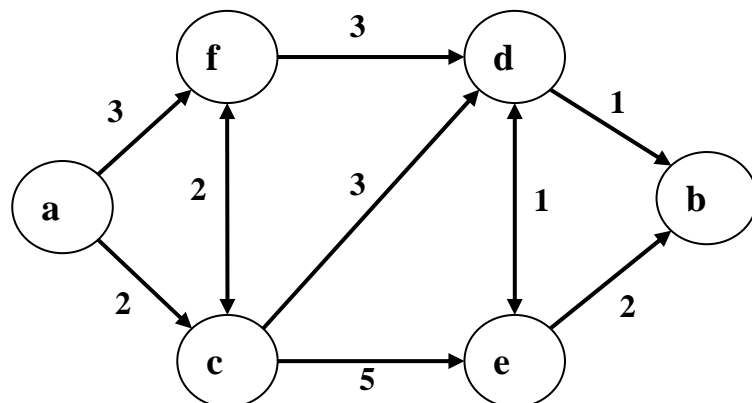   (b). from vertex "f" to vertex "a", "b", "c", "d" and "e".(10%)

Fig. 3

7. Use Greedy algorithm (Kruskal's algorithm) to construct the shortest spanning tree for Fig. 3. (20%) (Show: (I) Length sorting table. (II) Show every subgraph in each step. (III) Show Double Labels as shown in Example, for example, every root in separate trees, and update the root whenever connecting two separate trees into a tree.)
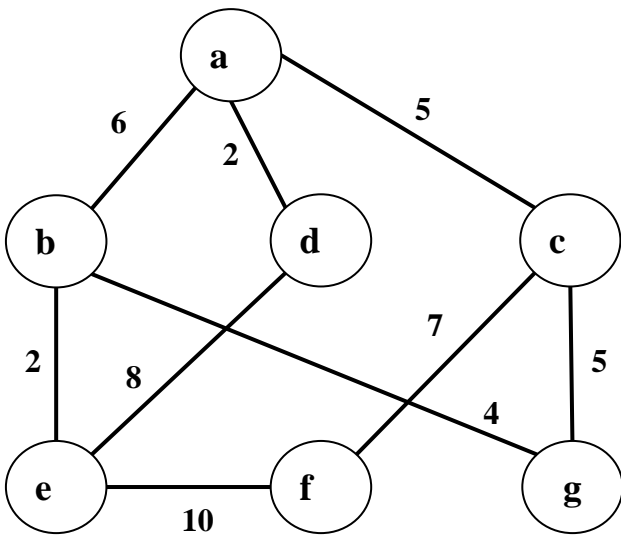

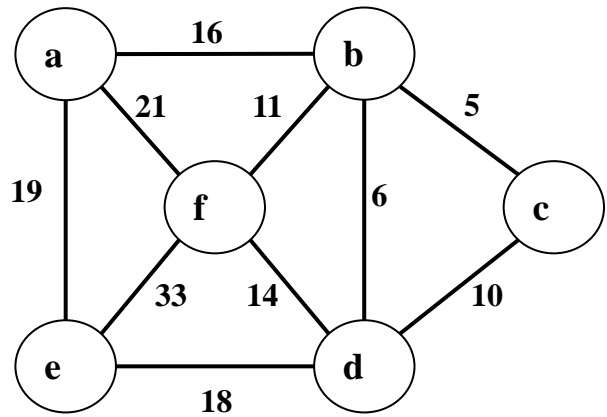Fig. 3   Fig. 4

8. Use Prim's algorithm to construct the shortest spanning tree for Fig. 4, suppose the initial vertex is "a" (20%) (Show: (I) the label of verities and (II) every subgraph in each step.)

9. What are the differences between shortest path problem and shortest spanning tree problem? Show those differences by an example. (5%)

10. What are the differences between Greedy algorithm (Kruskal's algorithm) and Prim's Algorithm. (10%)