COMP 2210

Final Exam – New Material Sample, Version: 1

Name: _____

UserID: _____

Section 1. Graphs

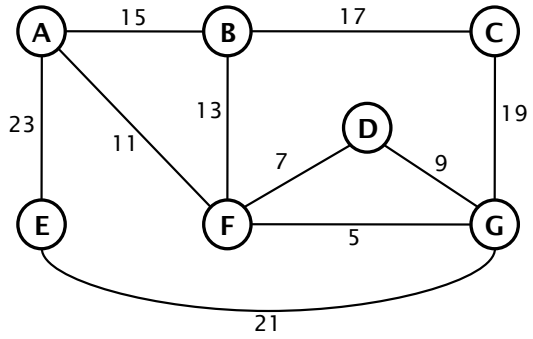

Figure 1: BFS, DFS, MST

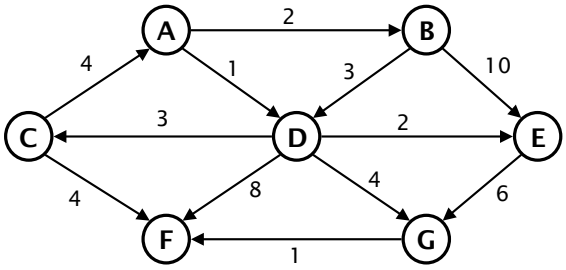

Figure 2: Dijkstra

1. Select the vertex listing that reflects the order in which the vertices of the graph in Figure 1 could be visited on a breadth-first search.

   (a) F, A, B, D, G, E, C

   (b) A, B, C, D, E, F, G

   (c) F, A, B, C, G, D, E

   (d) A, B, C, G, E, F, D

2. Select the vertex listing that reflects the order in which the vertices of the graph in Figure 1 could be visited on a depth-first search.

   (a) F, A, B, D, G, C, E

   (b) A, B, C, D, E, F, G

   (c) F, A, B, C, G, D, E

   (d) A, B, C, E, G, F, D

3. Select the vertex listing that reflects the order in which the vertices in the graph in Figure 2 would be *selected* in Dijkstra's algorithm assuming that the source vertex is A. Recall that each time a vertex is *selected*, it is known to be a destination on a least-cost path from the source vertex.

   (a) B, C, D, E, F, G

   (b) D, B, E, C, A, G

   (c) G, F, E, D, C, B

   (d) D, B, E, C, G, F

4. Select the cost listing that reflects the final values in the *cost* array after Dijkstra's algorithm is run on the graph in Figure 2, assuming that the source vertex is A. Each listing reflects the cost for vertex A, B, C, D, E, F, G respectively.

   (a) 0, 2, 4, 1, 3, 6, 5

   (b) 0, 2, 4, 1, 3, 9 ,5

   (c) 0, 2, 8, 1, 12, 8, 9

(d) 0, 2, 8, 1, 12, 6, 9

5. Select the edge listing that reflects the order in which the edges of the graph in Figure 1 would be added to the minimum spanning tree by Kruskall's algorithm.

   (a) 5, 7, 9, 11, 13, 15, 17

   (b) 5, 7, 11, 13, 17, 21

   (c) 11, 5, 7, 13, 17, 21

   (d) 17, 13, 5, 7, 11, 21

6. Select the edge listing that reflects the order in which the edges of the graph in Figure 1 could be added to the minimum spanning tree by Prim's algorithm.

   (a) 5, 7, 9, 11, 13, 15

   (b) 5, 7, 13, 15, 17, 21

   (c) 11, 5, 7, 13, 17, 21

   (d) 17, 13, 5, 7, 11, 15

7. Select the statement that most accurately describes the number of topological orderings of the vertices of the graph in Figure 2.

   (a) There are no topological orderings of this graph.

   (b) There is at least one topological ordering of this graph, since all graphs have their vertices ordered in this way.

   (c) There are 7! topological orderings of this graph, since there are 7 vertices.

   (d) There are 7×12 topological orderings of this graph, since there are 7 vertices and 12 edges.

Section 2. Disjoint Sets

8. Assuming that the *fast find* strategy was used to construct the disjoint set array below, how many connected components exist?

0	1	5	5	5	5	1	1	5	9
0	1	2	3	4	5	6	7	8	9

   (a) 1

   (b) 4

   (c) 5

   (d) 8

9. Assuming that the *fast union* strategy (without path compression) was used to construct the disjoint set array below, what is the result of `find(6)`?

1	1	1	8	3	0	5	1	8	8
0	1	2	3	4	5	6	7	8	9

   (a) 0

   (b) 1

   (c) 5

   (d) 6

Answer Key for Exam 1

Section 1. Graphs

1. (a)
2. (c)
3. (d)
4. (a)
5. (b)
6. (c)
7. (a)

Section 2. Disjoint Sets

8. (b)
9. (b)