Laboratory 12: Cover Sheet

Name _Leah Kramer_________________________ Date _________________________

Section ____

Place a check mark in the *Assigned* column next to the exercises your instructor has assigned to you. Attach this cover sheet to the front of the packet of materials you submit following the laboratory.

Activities	**Assigned:** Check or list exercise numbers	**Completed**
Implementation Testing	✓	✓
Programming Exercise 1	✓	✓
Programming Exercise 2	✓	✓
Programming Exercise 3	✓	✓
Analysis Exercise 1	✓	✓
Analysis Exercise 2	✓	✓
	Total	✓

Laboratory 12: Implementation Testing

Test Plan 12-1 (Weighted Graph ADT operations)			
Test case	**Commands**	**Expected result**	**Checked**
+Carson +Washoe +Reno +Dayton =Carson Washoe 5 =Washoe Reno 3 =Reno Dayton 6 =Carson Dayton 8 -Washoe #Reno Dayton 6 !Carson Dayton			✓

Laboratory 12: Programming Exercise 1

Test Plan 12-2 (showShortestPaths operation)			
Test case	**Commands**	**Expected result**	**Checked**
+Carson +Washoe +Reno +Dayton =Carson Washoe 5 =Washoe Reno 3 =Reno Dayton 6 =Carson Dayton 8 -Washoe #Reno Dayton 6 !Carson Dayton			✓

Laboratory 12: Programming Exercise 2

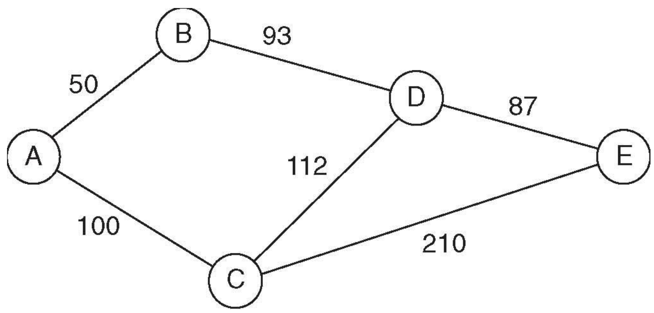
Test Plan 12-3 (hasProperColoring operation)			
Test case	**Commands**	**Expected result**	**Checked**
+Carson +Washoe +Reno +Dayton =Carson Washoe 5 =Washoe Reno 3 =Reno Dayton 6 =Carson Dayton 8 -Washoe #Reno Dayton 6 !Carson Dayton			✓

Laboratory 12: Programming Exercise 3

Test Plan 12-4 (areAllEven operation)			
Test case	**Commands**	**Expected result**	**Checked**
+Carson +Washoe +Reno +Dayton =Carson Washoe 5 =Washoe Reno 3 =Reno Dayton 6 =Carson Dayton 8 -Washoe #Reno Dayton 6 !Carson Dayton			✓

Laboratory 12: Analysis Exercise 1

[Please reference the lab book for the full description of this problem.] The following graph, for example,



yields the augmented path matrix shown below.

Vertex list		*Path matrix (cost|second vertex on shortest path)*					
Index	*Label*	*From/To*	*0*	*1*	*2*	*3*	*4*
0	A	0	0|0	50|1	100|2	143|1	230|1
1	B	1	50|0	0|1	150|0	93|3	180|3
2	C	2	100|0	150|0	0|2	112|3	199|3
3	D	3	143|1	93|1	112|2	0|3	87|4
4	E	4	230|3	180|3	199|3	87|3	0|4

Entry (0,4) in this path matrix indicates that the cost of the shortest path from vertex A to vertex E is 230. It further indicates that vertex B (the vertex with index 1) is the second vertex on the shortest path. Thus the shortest path is of the form AB...E.

Explain how you can use this augmented path matrix to list the vertices that lie along the shortest path between a given pair of vertices.

You would just be able to store the next vertex on the shortest path as another member of the node.

Laboratory 12: Analysis Exercise 2

Give an example of a graph for which no proper coloring can be created using less than five colors (see Programming Exercise 2). Does your example contradict the Four-Color Theorem?

A graph of three nodes that are circularly connected can not have proper coloring. No, this would not contradict the Four-Color theorem, because it states that creating a proper coloring of any planar graph requires using at most four colors.