

## Laboratory 12: Cover Sheet

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Name Ernest Landrito

Date 11/27/2013

### Section 1

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

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## Section 1

Check with your instructor whether you are to complete this exercise prior to your lab period or during lab.

Test Plan 12-1 (Weighted Graph ADT operations)			
Test case	Commands	Expected result	Checked
+	Insert	Inserted vertex	
-	Remove vertex	Removed vertex	
=	Insert Edge weight	Inserted weight	
?	Retrieve vertex	Retrieved vertex	
!	Remove edge	Removed edge	

## Laboratory 12: Programming Exercise 1

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### Section 1

Test Plan 12-2 (showShortestPaths operation)			
Test case	Commands	Expected result	Checked
+ c 1 + D 2 + E 3 = C E 10 = C D 2 = D E 2	Insert verteces and set edges	Path between c and e changed to 4	

## Laboratory 12: Programming Exercise 2

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### Section 1

Test Plan 12-3 (hasProperColoring operation)			
Test case	Commands	Expected result	Checked
+ C 2 + D 2 = C D 1	Insert two vertexes with the same color and set the edge	Not proper coloring	

## Laboratory 12: Programming Exercise 3

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### Section 1

Test Plan 12-4 (areAllEven operation)			
Test case	Commands	Expected result	Checked
+ c 1 + d 1 + e 1 = c e 1 = c d 1 = d e 1	Insert three nodes and connect them to each other	Even number of edges	

## Laboratory 12: Analysis Exercise 1

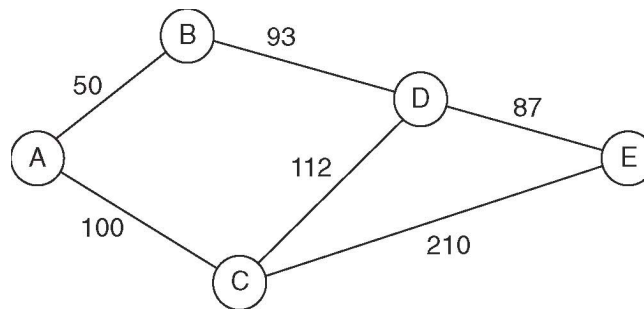
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### Section 1

[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 use the second number as the row and the index as the column and go to that point. Repeat this until the path is traversed.

## Laboratory 12: Analysis Exercise 2

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### Section 1

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?

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A three dimensional graph would need more than four color to have proper coloring. This doesn't contradict the four theorem.