CSC 255 *Objects and Algorithms* Special Project 2

Student Name _____ **Section** _____

Instructor _____ **Due Date** _____

Thoroughly read the objectives, instructions and requirements of this special project and then use suitable electronic technology tools to solve the given project(s).

Submit both your program source code, with your name, date and course information in the heading portion of your code, as well as the required output(s).

(Hamiltonian Circuits)

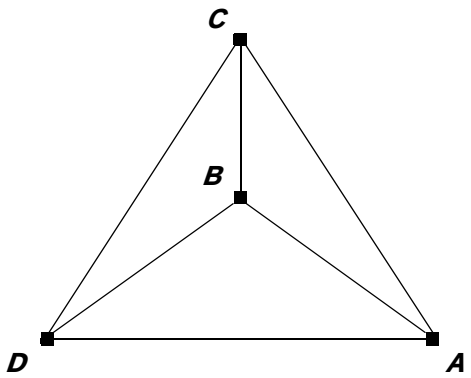
(100 Points Maximum) ***your score*** _____

Objective To determine the least path of a given Hamiltonian circuit.

PROJECT DESCRIPTION

Design an application which will find a minimal cost Hamiltonian circuit for the graph shown below. The circuit will begin at the home vertex A, visit every vertex once and only once and then return to the home vertex. The associated weights of the edges are also listed below.

Figure 1 An Example of a Complete Graph with Vertices A , B , C and D



Edge	Weight	Edge	Weight
A B	5	*B C*	6
B D	3	*C D*	12
A C	10	*A D*	8

Information About This Project

In management science, graphs are often used to analyze real - world business applications in order to find an optimal solution. A graph is a type of mathematical structure that represents items of interest such as a network of parking meters on a group of neighboring city streets. A graph consists of points, called vertices, and links, called edges, which connect these vertices. A connected graph is one for which it is possible to reach any vertex point from any particular starting vertex by traversing edges. A path is a connected sequence of edges within a graph. A path that starts and stops at the same vertex point is known as a circuit. A Hamiltonian circuit is a circuit, using distinct edges of a graph, which starts and ends at the same particular vertex point and visits each vertex once and only once.

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PROJECT Hamiltonian Circuits

When visiting vertices of a graph, one basic concern is perhaps to take the shortest possible path. Various algorithms can be applied to a graph to attempt to locate the shortest possible path or circuit.

A Traveling Salesperson Problem (TSP) is the problem of finding a minimum cost Hamiltonian circuit in a complete graph where each edge has been assigned a cost or weight.

Steps To Complete This Project

STEP 1 **Open Visual C++ .NET On Your Computer**

Launch Visual Studio .NET. Start a **New Project** (Console Application) by clicking [New] from the [File] menu and then choosing [Project ...]. Name your project as: **Hamilton**

STEP 2 **Design Your Code**

Write your program code which will allow the user to enter the distances for the weights of the edges of the graph. Upon a click event the user will then be displayed the Hamiltonian circuit which has a minimum path. Inform the user if more than one path is a minimum path.
Also, indicate to the user by how much is the minimal path differs from a maximal path.

STEP 3 **Run your Application**

Run and test your application.

STEP 4 **Submit Screen Snapshots**

Submit screen snapshots showing the operation of you program.