

## Lab 7 (April 26th)

Implement the traveling salesman problem. In spite of its intractability, it will have no trouble solving the problem for small N, say 10 cities or fewer. Try a non-directed graph. Use the brute-force approach of testing every possible sequence of cities. For a way to permute the sequence of cities, see the `anagram.java` program. Use infinity to represent nonexistent edges. That way, you won't need to abort the calculation of a sequence when it turns out that an edge from one city to the next does not exist; any total greater than infinity is an impossible route. Also, don't worry about eliminating symmetrical routes. Display both ABCDEA and AEDCBA, for example.

```
class TravelApp
{
    public static void main(String[] args)
    {
        Graph theGraph = new Graph();
        theGraph.addVertex('A'); // 0 (start)
        theGraph.addVertex('B'); // 1
        theGraph.addVertex('C'); // 2
        theGraph.addVertex('D'); // 3
        theGraph.addVertex('E'); // 4

        theGraph.addEdge(0, 1, 91); // AB
        theGraph.addEdge(0, 2, 62); // AC
        theGraph.addEdge(0, 3, 55); // AD
        theGraph.addEdge(1, 2, 44); // BC
        theGraph.addEdge(1, 4, 31); // BE
        theGraph.addEdge(2, 3, 52); // CD
        theGraph.addEdge(2, 4, 45); // CE
        theGraph.addEdge(3, 4, 83); // DE

        theGraph.startV(0); // set starting vertex

        theGraph.shortRoute(); // shortest route
    } // end main()
} // end class TravelApp
```

If you are using the above code in your solution, the output of your program will look like this:

```
A B C D E A: Invalid route
A B C E D A: Distance=318
A B D E C A: Invalid route
A B D C E A: Invalid route
A B E C D A: Distance=274
A B E D C A: Distance=319
A C D E B A: Distance=319
A C D B E A: Invalid route
A C E B D A: Invalid route
A C E D B A: Invalid route
A C B D E A: Invalid route
```

A C B E D A: Distance=275  
A D E B C A: Distance=275  
A D E C B A: Distance=318  
A D B C E A: Invalid route  
A D B E C A: Invalid route  
A D C E B A: Distance=274  
A D C B E A: Invalid route  
A E B C D A: Invalid route  
A E B D C A: Invalid route  
A E C D B A: Invalid route  
A E C B D A: Invalid route  
A E D B C A: Invalid route  
A E D C B A: Invalid route

Shortest route is

A B E C D A:

Distance is 274