

## CENG 202 PROGRAMMING ASSIGNMENT 4 (Graphs)

For this programming assignment, you will implement a Graph using an *adjacency list representation* and report the distance between given any two vertices.

### Input:

Your program will read a graph from a file called *graph.txt*. The file is a text file where the first line contains two numbers. The first is the number of vertices  $n$  and the second is the number of edges  $m$ . After this line there will be  $m$  lines with three numbers. The first two numbers represent the source and destination vertex for the undirected edge. The third number (positive integer) is the weight for that edge.

```
5 7
0 1 3
0 2 4
0 3 5
1 4 10
2 5 20
3 4 6
4 5 4
```

This file represents a graph with 5 vertices, 7 edges, and has edges (0,1) with weight 3, (0,2) with weight 4, (0,3) with weight 5, (1,4) with weight 10, (2,5) with weight 20, (3,4) with weight 6, (4,5) with weight 4.

### Distance definitions:

Distance between can be computed as follows:

1. Depth First Search (DFS) Distance: Run a DFS on the graph from the source and when the algorithm visits the destination return the sum of edge weights from source to destination. Edges will be discovered according to their weights in ascending order.
2. Breath First Search (BFS) Distance: Run a BFS on the graph from the source and when the algorithm visits the destination return the sum of edge weights from source to destination. Edges will be discovered according to their weights in ascending order.
3. Shortest Path Distance: Run Dijkstra's Algorithm and return the sum of edge weights from the source to destination.

### Output:

Your program will take three inputs from the user: type of the distance (BFS, DFS, and DIJKSTRA) and two input vertices and report the corresponding distance between these two vertices.

```
>distance DFS 0 5
17
>distance BFS 0 5
24
>distance DIJKSTRA 0 5
```

