

## Comp 3710 Artificial Intelligence Concepts.

## Assignment 1 (Points 10)

Due on 04/02/2021 Before 11:59pm

**Part I: (Points 8)**

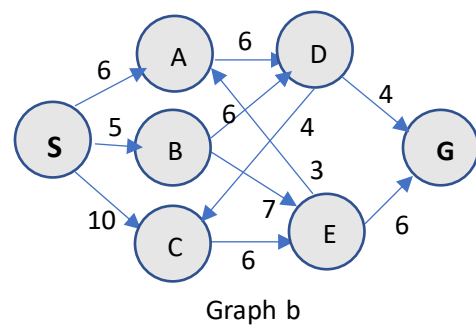
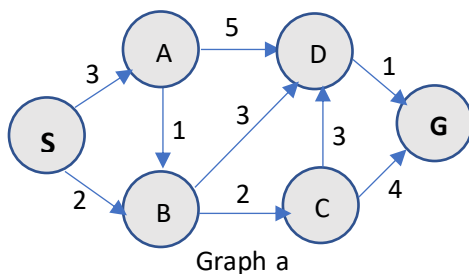
The graph search algorithms are important in AI. This assignment considers the following uninformed graph search algorithms in a given graph.

1. Breadth First Search (BFS) (2 points)
2. Depth First Search (DFS) (2 points)
3. Iterative Deepening Search (IDS) (2 points)
4. Uniform Cost Search (UCS) (2 points)

Your task is to implement the above algorithms to find the **traversal path** and **exact path** of any given graph (State Space Graph). You can use any programming language.

**Hint:** A state-space graph can be represented as a search tree; the start state is the root node, and children correspond to successors. There are two popular options for representing a graph: adjacency matrix and adjacency list. You can insert the given graph using either of these options. Using an adjacency list is easy for smaller graph representation.

Consider the following two graphs to test your algorithms:



Sample Output of Graph a:

*BFS:*

*Traversal path: SABBDCCDGDG*

*Exact path: SADG*

*DFS:*

*Traversal path: SABCDG*

*Exact path: SABCDG*

*IDS:*

*Traversal path: S SAB SABDBCD SABCDGDG*

*Exact path: SADG*

*UCS:*

*Traversal path: SBABCDG*

*Exact path: SBDG*

**Part I: (Points 2)**

Implement the algorithms in the first part on a randomly generated space graph. To generate a random space graph, you can send two parameters to decide the number of edges and number of nodes. Then you can set the start and goal state.

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**For your Knowledge:**

How will you solve the famous Toy Problem, missionary-cannibal problem using BFS and DFS algorithms? Understand the states clearly to represent in a table or a diagram.

Practice the implement to solve the missionary-cannibal problem using BFS and DFS.