Course: **Artificial Intelligence** **(Fall 2021)**

Resource Person: **Hafiz Ahmad Farooq** **ASSIGNMENT–1 (Uninformed and Informed Search)**

Total Points: 30
Submission Due: Thursday, March 24, 2022 – 11:59PM

Instructions: Please Read Carefully!

- **This is an individual assignment. Everyone is expected to complete the given assignment on their own, without seeking any help from any website or any other individual.** There will be strict penalties for any work found copied from any source and the university policy on plagiarism will be strictly enforced.
- You are expected to submit this assignment as:
    a. Create a **"single code file"** for the assignment solution.
    b. Make sure to run the test program using all algorithms and test data.
- Assignment is to be submitted in reply to the assignment posted on the **Google Classroom**.
- Late submissions will have a **30% negative** penalty.

INSTRUCTIONS

In this assignment you will traverse given graph by BFS (Breadth – First Search) and DFS (Depth – First Search). Please read all sections of the instructions carefully:

CHOICE OF PROGRAMMING LANGUAGE

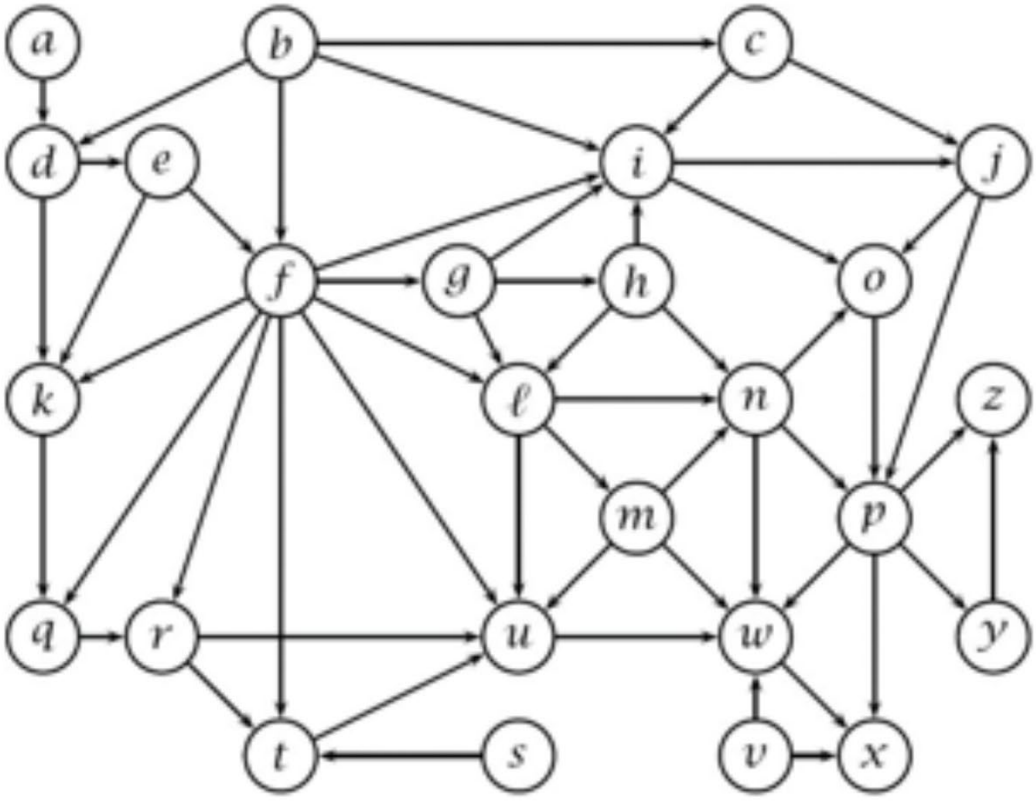
You may use either **Python** programming language to write the solution of this programming assignment. No other programming language should be used.

ASSIGNMENT CONTENTS

I. Problem Statement
II. What You Need to Submit
III. Important Information
IV. Before You Finish

NOTE: This assignment incorporates material learned from both Uninformed search and Informed search (Chapter-3).

I. Problem Statement



What is the order of visits of the nodes and the path returned by BFS and DFS?
NOTE:

- For each algorithm, you need to show the nodes included in the fringe.
- For DFS, the fringe would use a stack, for BFS, the fringe would use a queue.

II. What You Need to Submit

Your job in this assignment is to write:

- **`solve_graph_YOUR_ID.py`** **e.g.,** **`solve_graph_19024680.py`**

The method argument will be one of the following. You need to implement both of them.

- **`bfs`** **(Breadth-First Search)**
- **`dfs`** **(Depth-First Search)**

III. Important Information

Please read the following information carefully. Since this is the first programming assignment, you are being provided with many hints and explicit instructions. Before you post a clarifying question on the discussion board, make sure that your question is not already answered in the following sections.

1. Implementation

You will implement the following three algorithms as demonstrated in lecture. In particular:

- **Breadth-First Search**. Use an explicit queue, as shown in lab.
- **Depth-First Search**. Use an explicit stack, as shown in lab.

2. Tips on Getting Started

Begin by writing a class to represent the **state** of the graph at a given turn, including parent and child nodes. Feel free to experiment with your design.

You will not be graded on your design, so you are at a liberty to choose among your favorite programming paradigms. Your submission will receive full credit if your driver program outputs the correct information.

IV. Before You Finish

- **Make sure** your algorithms generate the correct solution.
- **Make sure** your program always terminates without error, and in a reasonable amount of time. **You will receive zero points if your program fails to terminate. Running times of more than a minute or two may indicate a problem with your implementation.**
- **Make sure** your program output follows the specified format exactly. You will not receive proper credit if your format differs from the provided examples above.

END OF ASSIGNMENT
