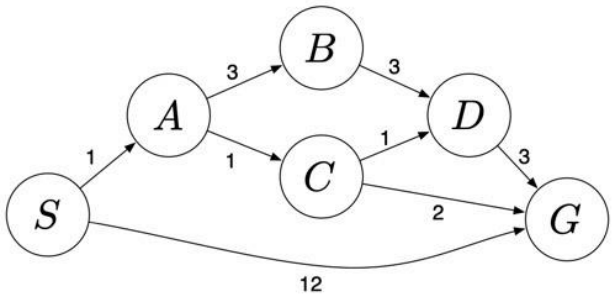
Kingdom of Saudi Arabia
Ministry of Higher Education
Prince Sattam Bin Abdulaziz University
College of Computer Engineering and sciences
Computer Science Department

المملكة العربية السعودية
وزارة التعليم العالي
جامعة الأمير سطّام بن عبد العزيز
كلية هندسة وعلوم الحاسب
قسم علوم الحاسب

Course Title: INTRODUCTION TO AI (CS3501)	**Homework 1**	**اسم الطالب: سعيد عبدالله الغامدي**
Instructor Name: Prof. Ammar Mohammed		**الرقم الجامعي:443051079**
Due Date: March 2, 2025		**الشعبة: 3907**
	2024-2025(2)	**المجموع: 10 /**

Q1) Consider the search graph shown below. **S** is the start state and **G** is the goal state. All edges are labeled by a cost. ***(6 Marks)***



For each of the following search strategies, give the path that would be returned or write none if no path will be returned. During the search, break any ties alphabetically.

1. What path would breadth-first graph search return for this search problem?

   Your Answer: S-G

2. What path would uniform cost search return for this search problem?

   Your Answer: S-A-C-G

3. What path would depth-first search return for this search problem?

   Your Answer: S-A-B-D-G

4. What path would iterative deepening search return for this search problem?

   Your Answer: S-G

5. Which search techniques of the previous problems will return the optimal solution?

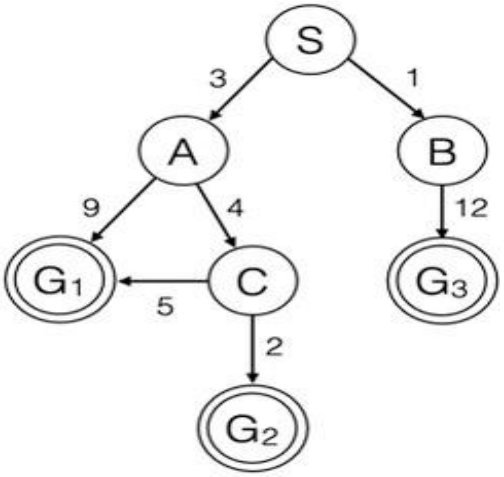
   Your Answer:
   uniform cost search

   Why??
   because IDS ,and DFS algorithm return the best solution in case the edges is equal but in our case here is not optimal .
   depth-first search is not grant optimal solution since it's could return longer path.

6. If the cost on all edges is equal, which search techniques of the previous problems will return the optimal solution?

   Your Answer:
   Iterative-Deepening Search since it's Space Complexity O(bd) which is better than others search algorithms in this case.
   where BFS is bad at Space Complexity and when edges is equal the UCS is acting like BFS.
   and depth-first search is not grant optimal solution since it's could return longer path

Q2) Consider the search graph below. What are the possible goals that could be returned by each of the following search algorithms? For this question, if there is a tie on the fringe, assume the tie is broken randomly**.** ***(4 Marks)***



1- Depth -First Search

Your Answer:

The possible goals that could be returned are G1,G2 or G3 depending on the order of expansion.

- If A is expanded first and G1 is the last node added to the frontier, the returned path will be: S-A-G1
- If A is expanded first and C is the last node added to the frontier the returned path will be: S-A-C-G2
- If B is expanded first and is the last in the frontier the returned path will be: S-B-G3

2- Breadth-Frist Search

Your Answer:

The possible goals that could be returned are G2 or G2 depending on the order of expansion.

- If A is expanded first, its children will be visited before B children, leading to the path: S - A - G1
- If B is expanded first, its children will be visited before A children, leading to the path: S - B - G3