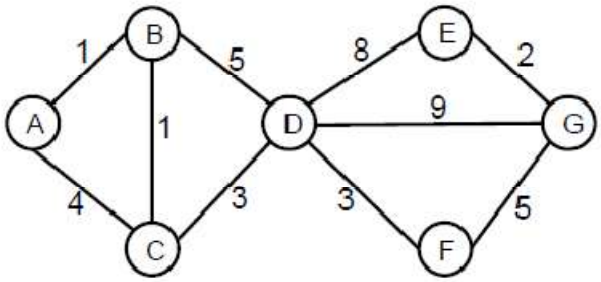
Student ID_____

Problem 1

Figure shows a state space graph problem with **A** being the start state and **G** is the **goal** state. All valid paths from a node to other nodes are bidirectional and are represented as edges. The numbers by the edges indicate the corresponding action costs.



For each of the following search algorithms, write down the **nodes in order** they are **removed from the fringe** during the course of search algorithm. Also give the **final path** as returned by the search algorithm and final **fringe state** when the goal was found.

Assume that the successor function returns the states in alphabetic order and that the search algorithm inserts these in the fringe in the same order.

Also assume that the Tree-Search version of the algorithms is being used.

Breadth-First Search **[2 Point]**

Nodes in order of retrieval from fringe :

Path from start to goal:

Fringe state when the goal was found

Uniform-Cost Search **[2 Points]**

Nodes in order of retrieval from fringe :

Path from start to goal:

Fringe state when the goal was found

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Depth-First Search **[2 Point]**

Nodes in order of retrieval from fringe :

Path from start to goal:

Fringe state when the goal was found

Problem 2 [4 Points]

Multiple Choice Questions

Two search algorithms are said to be equivalent iff they expand the same nodes in the same order and return the same solution. Let d_{ij} represent the action cost of going from state i to state j.

Mark all choices for costs d_{ij} that make running Uniform Cost Search algorithm with these costs d_{ij} equivalent to running Breadth-First Search.

Note: Negative marks will be awarded for incorrect choices

I. **$d_{ij} = 0$**

II. **$d_{ij} = a$, $a > 0$. a is a constant**

III. **$d_{ij} = a$, $a < 0$. a is a constant**

IV. **None of the above**

Mark all choices for costs d_{ij} that make running Uniform Cost Search algorithm with these costs d_{ij} equivalent to running Depth-First Search.

I. **$d_{ij} = 0$**

II. **$d_{ij} = a$, $a > 0$. a is a constant**

III. **$d_{ij} = a$, $a < 0$. a is a constant**

IV. **None of the above**