# CSci 4511
Midterm 1

Name: ⸺⸺⸺⸺⸺⸺⸺⸺⸺⸺⸺⸺

Student ID: ⸺⸺⸺⸺⸺⸺⸺⸺⸺

Instructions: The time limit is 75 minutes. Please write your answers in the space below. The exam is open book and notes. You may use electronic devices to ONLY look at either an e-book version or electronic notes. You may not use the internet, program/run code or any other outside resources. For all questions you must **show work**.

Problem (1) [15 points]
Run A* on the following graph from initial state "A" to goal state "G". Show at every step (1) the fringe/todo list with the f-cost values for each node and (2) which node you are picking next.


Heuristic:
A=8
B=3
C=5
D=2
E=6
G=0
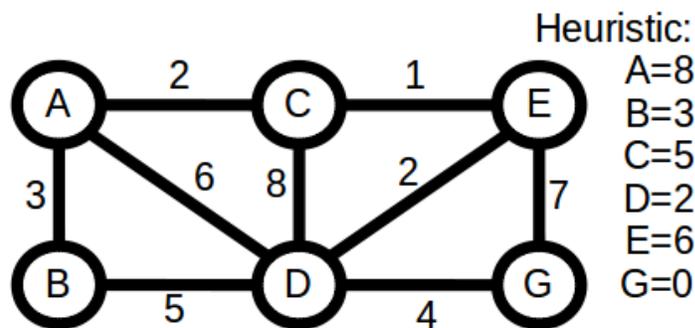
Problem (2) [20 points]
Answer the following:

- Explain what effect having a partially observable vs. fully observable problem makes when doing a search.

- Suppose you had a problem that you initially thought was sequential, but then you found a way to frame it in a more episodic way. Would you want to do this? Why? In other words, what effect would this have when solving the problem (i.e. how would the search change).

Problem (3) [15 points]

Convert the following tree into a graph. Is the shown heuristic consistent and/or admissible?

Heuristic:
A=7
B=5
C=5
D=1
E=2
G=0
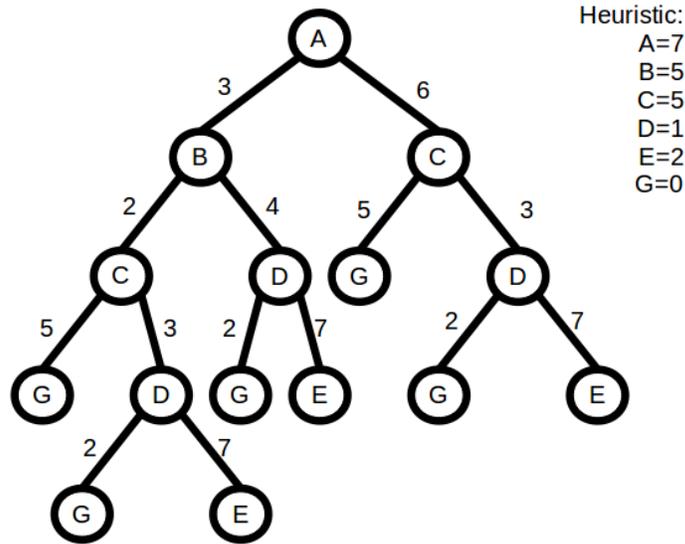
Problem (4) [25 points]

Which of the algorithms listed below can be used as the sub-search in bi-directional search? For each algorithm that you mark as "usable", explain when you would use it over the other "usable" algorithms (i.e. when is the sub-search most applicable).

- Depth first search

- Breadth first search

- Depth limited search

- Iterative deepening depth first search

- Uniform cost search

- A* search

Problem (5) [25 points]
Answer the following:

- Explain why a complete-state formulation can be more difficult to use, despite it having fewer states to search.

- Explain why depth first search does not work well on graphs. (Hint: consider iterative deepening A*.)