King Fahd University of Petroleum & Minerals
Information and Computer Science Department

ICS 381: Principles of Artificial Intelligence (Term 211)

Homework Assignment #1 [Due: Sep. 27 before midnight]
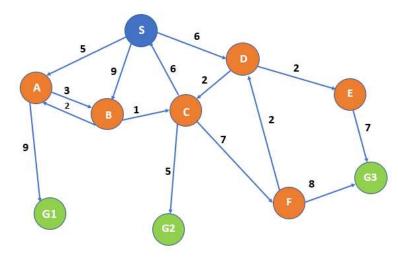
Reading: Chapter 1, 2 and 3

Question 1: For each of the following activities, give a PEAS description of the task environment and characterize it in terms of the properties (observability, single or multi-agent, deterministic/ stochastic, episodic/sequential, static/dynamic/semi, discrete/continuous).

- Part-picking robot
- Interactive tutor
- Search engine
- Playing soccer
- Tic-tac-toe game

Question 2: Draw the complete state space representation for the farmer, goat, wolf, cabbage problem which is described as follows. A farmer with his goat, wolf and cabbage are one side of a river (Say West Bank). The farmer wants to move with the other characters to the other side of the river (Say East Bank). There is a boat that can carry only two things at most. Only the farmer can row the boat. The wolf should not be left alone with the goat and the goat should not be left alone with the cabbage. Let nodes in the state space represent the location of each element, e.g. (w,e,w,w) means farmer, wolf and cabbage are on west side and goat on east side. Indicate the initial and goal states and show a sequence of valid transitions to reach to the goal.

Question 3: Apply each of the following graph search strategies on the given graph. Show clear steps and the order in which states are expanded as well as the path returned by each strategy and its cost to the goal. Assume ties to be resolved in alphabetical order and a state is expanded only once. Also assume the agent starts at **S** and wants to reach any of the goal states {G1, G2, G3}.

a) Depth-first search (DFS)
b) Breadth-first-search (BFS)
c) Iterative deepening search (IDS)
d) Uniform cost search (UCS)