4511W, Spring-2018
ASSIGNMENT 1 :
Assigned: 01/30/18 Due: ~~02/04/18~~ 02/06/18 at 11:55 PM (submit via moodle, you may scan or take a picture of your paper answers) Submit only pdf or txt files (in a zip if you have multiple files)

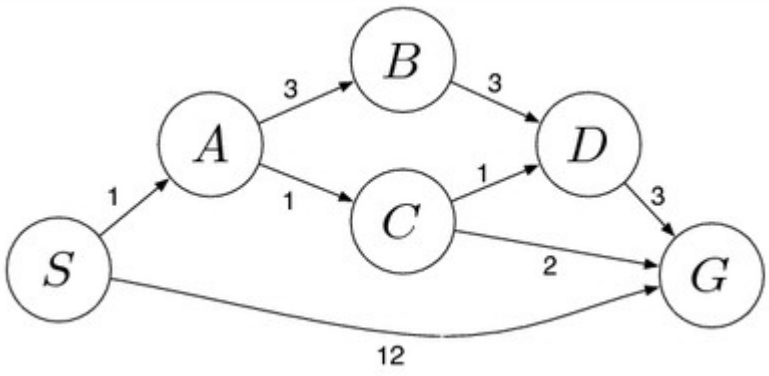
Problem 1. (15 points)
For each of the scenarios below, classify the environment based on the seven classifications discussed in class (i.e. fully/partially observable, single/multi-agents, etc.). Additionally for each of the seven classifications, provide a single sentence supporting your reasoning.

(1) Tic-Tac-Toe.

(2) The card game "memory" or "concentration". See: https://en.wikipedia.org/wiki/Concentration_%28game%29

(3) Suppose you are a TA for this course and assigned to grade Problem 1 on this homework for all students. (i.e. the actions are to assign a score to a student then to go to the next one.)

Problem 2. (20 points)
Consider the graph shown below. Assume you start at "S" and want to reach "G". Show step-by-step how you would solve this with uniform-cost search. At each step show:
(1) the "fringe"nodes
(2) the "explored" nodes
(3) which node you are taking next from the fringe set to move to the explored set



Problem 3. (25 points)
For each of the situations specify: (a) The initial state, (b) possible actions from the initial state, (c) a general description of other states, and (d) whether the approach is incremental or complete-state.

(1) Suppose you are making a salad. This requires you to chop the following; lettuce, tomatoes and carrots. You then need to mix them all together with some dressing.

(2) Suppose you are in your 3rd year of college and want to schedule classes for the next four semesters. There are a number of required classes and electives you want to take (not all classes are offered in all semesters).

(3) You are a UPS truck and need to deliver packages to 20 different houses. (Problem 5.3 also asks how you would search this.)

Problem 4. (25 points)
Between depth first search, breadth first search and uniform-cost search, for each part say which search is most appropriate? Support your answer with one to two sentences explaining why.

(1) While seeking when playing hide-and-go-seek.

(2) You got 5 songs for free from iTunes. You want to get the most amount of music played (i.e. longest duration of music) while also having songs from at least 3 different genres.

(3) Continuation of problem 3.3: What search would you use on this representation as the UPS if you wanted to minimize distance.

Problem 5. (15 points)
For each of the following, state whether the task is being done rationally. (Note: this is the strict artificial intelligence definition of "rational".)

(1) Humans playing chess. (The goal is to win and the humans know the rules.)

(2) A "dumb" Roomba that just cleans and moves forward until it hits an obstacle. The Roomba then turns a random direction. The goal is to clean a single room as quickly as possible. (You can assume the Roomba can perfectly aim and sense when it hits something.)

(3) A "smart" Roomba that has figured out a map of the room and zig-zags back and forth to clean it (see picture below). Again the goal is to clean the room as fast as possible. Note: there might be furniture in the room.