Homework 1

***Due date**: Thursday, Jan 25 11:00 am (morning of Exam 1)*

Submit your solutions to Canvas. You may type your answers in a digital file, or upload a scanned/photographed copy of your handwritten homework

Ch 1: Introduction

1. Problem 1.7 from textbook
2. Do you think that the Turing test is a good way to judge a *rational agent*? Justify your answer.

Ch 2: Agents

3. Problem 2.4
4. Problem 2.5

} From textbook

Ch 3: Search

5. Problem 3.2
6. Problem 3.6
7. Problem 3.10
8. Problem 3.14
9. Problem 3.21

} From textbook

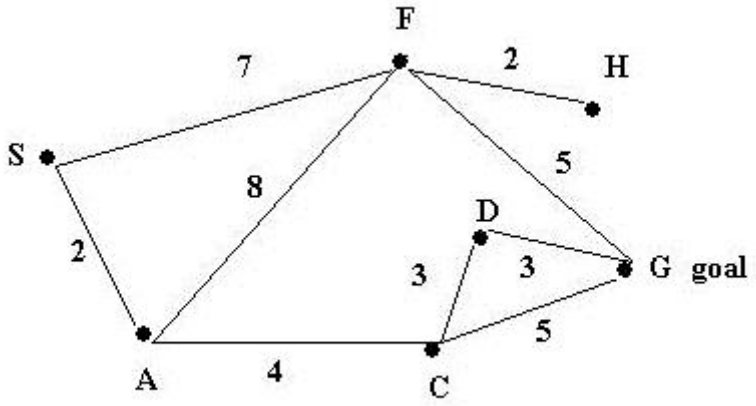
10. In this problem, you are asked to select the best search strategy for each of the situations given below. You can choose any of the informed or uninformed search methods discussed in class. Justify your answer briefly but decisively.

    a) All the arc (= action) costs are equal. No heuristic information is given. Time is not a problem, and you have plenty of space. But you must find an optimal solution.

    b) Cost and heuristic information are given. You need to find an optimal solution and you want to save as much time as possible.

    c) The search space is large and the depth of the solution is not known. No cost and no heuristic information are given. You need to find the shallowest solution but you don't have much memory/space available.

11. Suppose that you need to find a path between S and G in the following graph. The number attached to each edge in the graph represents the COST of traversing the edge.



Assume also that the ESTIMATED distances to the goal are given by the following table:

Node	S	A	C	D	F	G	H
Est. dist. To G	10	5	4	3	4	0	2

For EACH of the following search methods list the nodes in the order in which they are EXPANDED by the search method while looking for a solution. Show also a list of the paths stored in the fringe queue at each step. When everything else is equal, order the nodes in alphabetical order.

a) Depth first Search
b) Breadth first Search
c) Uniform Cost Search
d) Greedy best first
e) A* search

Ch 5: Adversarial Search

12. Problem 5.9 from textbook
13. Suppose that you and your friend are playing a game. It is your turn to move (you are MAX), and the tree below represents your situation. The values of the utility function at the leaf nodes are shown in the tree. Use the **minimax** procedure together **with alpha-beta pruning** to select your next move. Mark clearly with an "X" the nodes/branches that don't need to be evaluated. When you decide to prune a node/subtree, explain why that pruning was possible.