EECS 391: Introduction to AI (Fall 2017) Written Homework 1 (Max Points: 100)

Due in class Tue Sep 19. Show all relevant work. Write clearly and concisely. Before turning in your work, staple your answer sheets together and write your name and Case ID on the front page. *Written assignments must be handed in before class even if you have an electronic version*. This is to facilitate grading. Assignments received after class are considered late.

Problem numbers below refer to the *3rd edition* of Russell & Norvig.

1. Research one application of AI from the lectures or from other applications you know about and write a high level summary about the methods used to solve it. Cite any articles or papers you used to research the application. (10 points)

2. Variation of problem 2.4 (For each of the following activities …), but choose only *two* examples. In addition: describe in general terms how the environment might be represented or suitably transformed so that the performance can be calculated. (10 points)

3. Consider a discrete fully observable world with S states. How many distinct simple reflex agents, each with A actions, can be written for such a world? Two agents are distinct if there exists some world state where they take different actions. (10 points)

4. Now suppose each agent in the previous question is equipped with a *memory* so it can remember the past k states when choosing an action at the current state. How many distinct agents, each with A actions, can be written for such a world? Explain. (10 points)

5. What are the memory requirements for a complete representation of the 8-puzzle state space? What about a 15 puzzle? Explain your reasoning. Also explain the what information needs to be stored for a single state and the minimal memory requirements for that information. (10 points)

6. What is the state space size for a 2x2 Rubik's cube? Explain your reasoning. Contrast the state transition function of the 2x2 cube with the 8-puzzle. How many "tiles" the cube have? How many states does each "tile" have? (10 points)

7. Problem 3.7 (Consider the problem of finding the shortest path …), but only parts a and b. Explain your reasoning. (10 points)

8. Problem 3.21 (Prove each …) (10 points)

9. Problem 3.23 (Trace the operation …), but use Fagaras and Drobeta as the starting and ending cities. (10 points)

10. Problem 4.1. (Give the name …) Explain your reasoning. (10 points)