Name: _____

CS 441

Midterm Examination

Spring 2015

1. What is intelligence? What does it mean for a machine (computer) to be intelligent? Explain and describe some of the different approaches that have been used to implement intelligence in machines/computers.

2. What is knowledge? Describe how knowledge is represented and used in an expert system. As part of your answer, describe the basic mechanism(s) by which an expert system operates. You may include one or more diagrams if this helps to explain your answer.

3. Describe the rationale/purpose behind using probabilistic expert systems and expert systems with certainty factors. What are the advantages/challenges of each? Elaborate specifically on the difficulties faced when trying to capture knowledge from the domain expert. Based on your answer and your understanding of probabilistic expert systems, expert systems with certainty factors, and fuzzy expert systems, do you see any instance in which fuzzy experts systems would not be the preferred choice? Explain.

4. What is fuzzy logic? What do we mean by fuzzy systems? How do fuzzy systems differ from "crisp" systems? What are the main steps in the fuzzy inference process?

5. Design an expert system (simple rule-based system, as we discussed in Chapter 2) to predict the likelihood of getting a speeding ticket based upon: a) your model of vehicle, b) the color of your vehicle, and c) the speed you are traveling. Think about how the inputs might affect the outcome. For example, if you are driving a 'red' 'sports car' 'slightly over the speed limit', you might be more likely to get a ticket than someone driving a 'white' 'sedan' 'slightly over the speed limit'. Encode your "expert knowledge" into a set of rules for the expert system. You will need to decide on appropriate linguistic (symbolic) values for each input and output.

6. Considering the same problem as Question 5, adapt your expert system to use fuzzy inputs and outputs. Give the membership functions for each linguistic value of each input and output. Makeup one set of inputs and demonstrate the output that would be generated by the fuzzy inference system (such as we discussed in class on Tuesday).