Homework 1

Total Points : 100
Due Date : Sept 7, 2010 at 23:45 Eastern Time

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1. **[12 points] Describe PEAS for the following:**

   a. Bot to display advertisements in a search engine (eg. Bing, Google etc.)
   b. Industrial robot (eg. detect surface defects on automobile body in assembly line)
   c. Recommendation system (eg. Amazon book suggestion system)

   In each case, state whether the environment is fully observable, deterministic, episodic, and single agent.

2. **[18 points] Answer the following questions from the textbook: 2.6a, 2.6b, 2.12**

3. **[20 points] Introducing our agent Mr.Wuf who will help us moving things from one place to another. One day, Mr.Wuf is assigned a task of transferring a set of boxes one-by-one by lifting them from location A and placing them in location B inside a building. A signaling system says whether the agent is near its destination or not. The room has stationary obstacles whose locations are unknown. If the agent bumps into an obstacle, the box in hand will fall down and some boxes have fragile goods. But there are safe paths, some longer than the others. Your must help Mr.Wuf with the task by answering the following questions. Mr.Wuf does not have enough time !!!**

   a. Define PEAS.
   b. Is it sufficient for Mr.Wuf to be simple reflex ? Why or why not ?
   c. Mr.Wuf likes to move randomly. To what extent would this help ? Are there drawbacks ?
   d. Suggest one improvement to Mr.Wuf's design. Does your improvement have drawbacks ?

4. **[30 points] Consider the following english sentences.**

   1. Marcus was a man
   2. Marcus was a Pompeian
   3. All Pompeians were Romans
   4. Caesar was a ruler
   5. All Romans were either loyal to Caesar or hated him

6. Everyone is loyal to someone
7. Any man only tries to assassinate rulers he is not loyal to
8. Marcus tried to assassinate Caesar

Now answer the following questions:

a. Convert the above into first order predicate logic using the following predicates: ruler, man, Pompeian, Roman, loyalto, hate, tryassassinate Use appropriate quantifiers and connectors.
b. Convert the above sentence to CNF.
c. Answer the following questions using resolution discussed in class based on the knowledge above:
   1. Was Marcus loyal to Caesar ?
   2. Did Marcus hate Caesar ?

5. [20 points] Consider the following English statements:

1. John is a graduate student
2. Graduate students buy cheaper books
3. AI book is costly
4. The neighborhood store "Bookmarks" has a discount on the AI book
5. Books on discount are cheap

Now, using the resolution approach for first order predicate logic discussed in class, answer: "Will John buy the AI book from BookMarks?"