GS/CSE 6390A 3.0 Knowledge Representation
Fall 2008

Dept. of Computer Science & Engineering
York University

Assignment 3

Total marks: 140.

Out: February 9
Due: March 9

Note: Your report for this assignment should be the result of your own individual work. Take care to avoid plagiarism ("copying"). You may discuss the problems with other students, but do not take written notes during these discussions, and do not share your written solutions.

1. Exercise 1 of Chapter 11 in the textbook, part (b), (c), (d), and (e). [30 points]
2. Exercise 2 of Chapter 12 in the textbook. [30 points]
3. Exercise 4 of Chapter 13 in the textbook. [30 points]
4. Answer the 4 questions in the Exercises at the end of Chapter 14 (pp. 301-303) for the "Blocks World" example on p. 302 in the textbook. [20 points]
5. Answer the 7 questions in the Exercises at the end of Chapter 15 (pp. 323-325) for the "Blocks World" example in the textbook. [30 points]

Bonus Problem [10 points]

a) Write Prolog versions of the precondition axioms, successor state axioms, and initial state axioms for the "Blocks World" example of Chapter 15.

b) Write a Golog program that represents a plan to solve the example. Define a fluent `goal(s)` representing the goal in the example. Then, use the Golog interpreter on the course web site to run the program and confirm that the goal holds in the situation where the program terminates. That is, show that the query `?- do(your_program,s0,S), goal(S).` succeeds with an appropriate binding for the situation `S`.

c) You can define the iterative deepening planning procedure described in Section 15.3.2 of the textbook in Golog as follows:

```
proc(idPlan(N), idPlan(0,N)).

proc(idPlan(M,N), dfPlan(M) #
       ?(M < N) : pi(m1, ?(m1 is M + 1) : idPlan(m1,N))).

proc(dfPlan(N),
      ?(goal) #
      ?(N > 0) : pi(a, ?(acceptable(a)) : a) :
             pi(n1, ?(n1 is N - 1) : dfPlan(n1))).
```

Define the forward filtering fluent `acceptable(a,s)` appropriately, and show that this planning procedure can find a solution to the "Blocks World" example. That is, show that the query `?- do(idPlan(5),s0,S).` succeeds with a binding for the situation `S` that is a solution to the example.