ECS 170 Artificial Intelligence

Sample Solution to Sample Test

This is a sample set of questions and sample answers. You may be asked to do more work than what you see here.
The midterm covers material up to and including the class lecture immediately prior to the examination. You will have full class time to answer the questions.

1. On Agents

Give the initial state, goal test, operators and path cost for the problem described below. Your formulation should be precise and hang togehter so that it could be implemented.

A monkey is in a room with a crate, bananas suspended just out of reach on the ceiling, he would like to get the bananas

Sample solution: Initial state: Monkey in the room. Banans hanging from the ceiling; Bananas out of reach, Crate in the room.
Goal State: Monkey has bananas
Operators: Move the crate from one position to another, Hop on crate, Hop off crate, Walk from one position to another, Grab bananas
Path Cost: Numberof operations

2. On Search: (20 Points)

Consider the problem of searching for a path to some specific goal node. Assume that the search tree exhibits a branching factor of 1 at every move and the solution is at depth *n.* where each node has *b* children. Assume that the goal node is actually at depth *d* (although our search algorithm doesn't know that). Estimate the computational effort of the depth first search and compare it with iterative deepening search.

Sample solution: DFS: Exactly n expansions, IDA: O(n^2)

3. On Propositional Logic

(a) Is the sentence "Either 2+2 =4 and it is raining, or 2+2=4 and it is not raining" making a claim about arithmetic, weather, or neither? Explain.

Sample solution: Let E stand for "2+2=4" and R stand for "It is raining".
Now the given sentence is (E^R) V (E^~R) which is logically equivalent to E and completely independent of R.
So the sentence is making a claim about arithmetic.

4. On First-order Logic.

(a) Translate the following English sentence into first-order logic, using consistent vocabulary which you must define:

"Not all students take both history and biology"

Sample solution: Let the basic vocabulary is as follows.

Takes (x,c): Student x takes course c

H: a specific history course

B: a specificbiology course

A: universal quantifier

(I am using the symbols A and E because I do not have the proper symbols on my keyboard. You are expected to use the correct symbols)

E: Existential quantifier

~Ax student (x) => (Takes(x,H)^Takes (x, B))