Graduate Comprehensive Exam: Artificial Intelligence (Spring 2006)

Answer all questions on the exam. You may use the back for additional space. Total: 100 points. Good Luck.

1. (30 pts) Searching:

   (a) What is the key advantage of iterative deepening search over breadth-first search? Illustrate it with an example.

   (b) What is the key difference between uninformed and informed search algorithms? Name one uninformed and one informed search algorithm.

   (c) What are the similarities and differences between constraint satisfaction problems (CSP) and general search problems.

2. (10 pts) Logic: Why are Horn clauses interesting?

3. (30 pts) Planning:

   (a) What are the elements of a STRIPS operator?

   (b) What are the similarities and differences between a STRIPS operator and an operator in general search?

   (c) Describe the concept of "threat" in partial order planning. What is the reason for ordering constraints in partial order planning?

4. (30 pts) Decision-tree learning:

   (a) Describe the axes and the typical shape of a *learning curve* and illustrate with an example. How does one determine if an algorithm is better than another using their learning curves?

   (b) Describe why the *training* and *test* sets need to be disjoint. What would happen if both sets are the same?

   (c) Describe what *overfitting* means. How does overfitting affect the performance of a learned tree?