Midterm Study Guide

Midterm Time and Place:
- Wednesday, February 25, 10:10am - 11am
- Maginnes 111 (our usual room)

Format:
The test will be held in class. You can expect the following types of questions: true/false, short answer, and smaller versions of homework problems. It will be closed book and closed notes. However, you may bring one 8 ½ x 11” “cheat sheet” with handwritten notes on one-side only. Also, all calculators, PDAs, portable audio players (e.g., iPods) and cell phones must be put away for the duration of the test.

Coverage:
In general, anything from the assigned reading or lecture could be on the test. In order to help you focus, I have provided a partial list of topics that you should know below. In some cases, I have explicitly listed topics that you do not need to know. In addition, you do not need to memorize the pseudo-code for any algorithm, but you should be able to apply the principles of the major algorithms to a problem as we have done in class and on the homework.

- Ch. 1 – Introduction
  o rationality
  o definitions of “artificial intelligence”
  o The Turing Test
  o you do not need to know:
    ▪ dates and history

- Ch. 2 - Agents
  o PEAS descriptions
    ▪ performance measure, environment, actuators, sensors
  o properties of task environments
    ▪ fully observable vs. partially observable, deterministic vs. stochastic vs, strategic, episodic vs. sequential, static vs. dynamic, discrete vs. continuous, single agent vs. multiagent
  o agent architectures
    ▪ simple reflex agents, goal-based agents, utility-based agents
  o you do not need to know:
    ▪ learning agents

- Ch. 3 – Search (Sect. 3.1-3.5)
  o problem description
    ▪ initial state, actions (successor function), goal test, path cost, step cost
  o tree search
    ▪ expanding nodes, fringe
    ▪ branching factor
  o uninformed search strategies
    ▪ breadth-first, depth-first, uniform cost
    ▪ similarities and differences / benefits and tradeoffs between strategies
evaluation criteria
- completeness, optimality, time complexity, space complexity
  - you do not need to know:
    - depth-limited, iterative deepening or bidirectional search
    - the exact $O()$ for any strategy’s time/space complexity (but you should know relative complexity)

- Ch. 4 – Informed Search (Sect. 4.1-4.2)
  - best first search
  - evaluation function, heuristics
  - strategies
    - greedy search, A*
    - admissible heuristics
    - similarities and differences / benefits and tradeoffs between strategies
  - you do not need to know:
    - details of proof that A* is optimal if $h(n)$ is admissible
    - memory bounded heuristic search
    - learning heuristics from experience

- Ch. 6 - Game playing (Sect. 6.1-6.2, 6.4, 6.6-6.8)
  - two-player zero-sum game
  - problem description
    - initial state, actions (successor function), terminal test, utility function
  - minimax algorithm
  - optimal decision vs. imperfect real-time decisions
  - evaluation function, cutoff-test
  - you do not need to know:
    - alpha-beta pruning

- Ch. 7 – Logical Agents (Sect. 7.1-7.4)
  - knowledge-based agents
    - TELL, ASK
  - propositional logic
    - syntax and semantics
  - entailment, models, truth tables
  - valid, satisfiable, unsatisfiable
  - model checking
  - you do not need to know:
    - details of the Wumpus world

- Ch. 8 – First-Order Logic (Sect. 8.1-8.5)
  - syntax and semantics
    - be able to translate English sentences into logic sentences
  - quantification
    - existential, universal
  - domain, model, interpretation
  - you do not need to know:
    - specific axioms from the Minesweeper or genealogy examples
• “Intro to Prolog Programming” Reading, Ch. 1
  o syntax
    ▪ be able to write rules and facts in Prolog
    ▪ translating to FOL and vice versa
  o backward-chaining, depth-first search
    ▪ how to find the answers to a goal given a simple Prolog program