Midterm Study Guide

Midterm Time and Place:
- Wednesday, February 27, 10:10am - 11am
- Packard 258 *(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
    - rationality
    - definitions of "artificial intelligence"
    - The Turing Test
    - **you do not need to know:**
        - dates and history
- Ch. 2 - Agents
    - PEAS descriptions
        - performance measure, environment, actuators, sensors
    - 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
    - agent architectures
        - simple reflex agents, goal-based agents, utility-based agents
    - **you do not need to know:**
        - learning agents
- Ch. 3 – Search (Sect. 3.1-3.5)
    - problem description
        - initial state, actions (successor function), goal test, path cost, step cost
    - tree search
        - expanding nodes, fringe
        - branching factor
    - 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
  - o **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)
  - o best first search
  - o evaluation function, heuristics
  - o strategies
    - ▪ greedy search, A*
    - ▪ admissible heuristics
    - ▪ similarities and differences / benefits and tradeoffs between strategies
  - o **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)
  - o two-player zero-sum game
  - o problem description
    - ▪ initial state, actions (successor function), terminal test, utility function
  - o minimax algorithm
  - o optimal decision vs. imperfect real-time decisions
  - o evaluation function, cutoff-test
  - o **you do not need to know:**
    - ▪ alpha-beta pruning
- Ch. 7 – Logical Agents (Sect. 7.1-7.4)
  - o knowledge-based agents
    - ▪ TELL, ASK
  - o propositional logic
    - ▪ syntax and semantics
  - o entailment, models, truth tables
  - o valid, satisfiable, unsatisfiable
  - o inference algorithms
    - ▪ criteria: sound, complete
  - o model checking
  - o **you do not need to know:**
    - ▪ details of the Wumpus world
- Ch. 8 – First-Order Logic (Sect. 8.1-8.5)
  - o syntax and semantics
    - ▪ be able to translate English sentences into logic sentences
  - o quantification
    - ▪ existential, universal
  - o domain, model, interpretation

- "Intro to Prolog Programming" Reading, Ch. 1
  - syntax
    - be able to write rules and facts in Prolog
    - translating to FOL and vice versa
  - **you do not need to know:**
    - backward-chaining, depth-first search
      - how to find the answers to a goal given a simple Prolog program