

## Midterm Study Guide

### Midterm Time and Place:

- Wednesday, March 2, 1:10pm – 2pm
- Packard 466 (*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 reproduce 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, known vs. unknown
  - agent architectures
    - simple reflex agents, goal-based agents, utility-based agents
  - state representations
    - atomic, factored, structured
  - **you do not need to know:**
    - learning agents
- Ch. 3 – Search
  - problem description
    - initial state, actions, transition model, goal test, path cost/step cost
  - tree search
    - expanding nodes, frontier
    - branching factor
  - graph search
    - explored set
  - 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

- best first search
  - evaluation function
- informed search
  - heuristics
  - greedy best-first, A\*
  - admissible heuristics
  - similarities and differences / benefits and tradeoffs between strategies
- **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*)
  - details of proof that A\* is optimal if  $h(n)$  is admissible
  - memory bounded heuristic search
  - learning heuristics from experience
- Ch. 5 - Game playing (Sect. 5.1-5.2, 5.4, 5.7-5.9)
  - two-player zero-sum game
  - problem description
    - initial state, actions, transition model, 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
    - forward pruning
    - details of any state-of-the-art game playing programs
- Ch. 7 – Logical Agents (Sect. 7.1-7.4, 7.7-7.8)
  - 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
    - circuit-based agents
- Ch. 8 – First-Order Logic
  - syntax and semantics
    - be able to translate English sentences into logic sentences
  - quantification
    - existential, universal
  - domain, model, interpretation
  - equality/inequality
    - making statements about quantity (e.g., exactly two brothers)
  - **you do not need to know:**
    - specific axioms from the domains given in class or the book