

Last update: October 14, 2008

REVIEW FOR THE MIDTERM EXAM

CMSC 421: MIDTERM REVIEW

Midterm Exam

- ◇ Scope: Chapters 1–6, Section 17.6, and Common Lisp
The test won't include Chapter 7
- ◇ Open book, open notes
- ◇ No electronic devices

My exams often are very hard!

But don't let it bother you, because I grade on a curve
e.g., when I taught CMSC 421 in Fall 2007:

Midterm	Final	GPA
62%	64%	2.88

To help you prepare, the “private materials” web page has the midterm and final exams for the last four times I taught the course.

Chapter 1: Intelligent Agents

- ◇ What AI is:
- ◇ thinking versus acting
- ◇ humanly versus rationally

I won't ask any questions about Chapter 1

Chapter 2: Intelligent Agents

- ◇ Agents and environments
- ◇ Rationality
- ◇ PEAS (Performance measure, Environment, Actuators, Sensors)
- ◇ Environment types
- ◇ Agent types

Chapter 3: Search

- ◇ Problem types: deterministic/nondeterministic, fully/partially observable
example: vacuum world
- ◇ Tree-search algorithms
 - Breadth-first search
 - Uniform-cost search
 - Depth-first search
 - Depth-limited search
 - Iterative deepening
- ◇ tree search versus graph search

Common Lisp

- ◇ lists, atoms, list notation, dot notation
- ◇ defining your own Lisp functions
- ◇ built-in Lisp operators (functions, predicates, special forms, macros)
- ◇ loops and recursion
- ◇ functions as arguments
- ◇ sequences (lists, vectors, strings)
- ◇ destructive operators (e.g., `setf`, `nconc`)
versus nondestructive operations (e.g., `setq`, `append`)
- ◇ programming style

Chapter 4: Informed Search and Exploration

- ◇ Heuristic search algorithms
 - Greedy search
 - A* (two versions)
 - IDA*

- ◇ Heuristic functions
 - admissibility
 - consistency
 - dominance
 - problem relaxation

- ◇ Iterative improvement algorithms
 - Hill climbing, simulated annealing,
 - local beam search, genetic algorithms

Things you don't need to know:

sections 4.4 (continuous spaces) and 4.5 (online search)

Chapter 5: Constraint Satisfaction

- ◇ Definition: variables, constraints
- ◇ Representation: constraint graphs
- ◇ Backtracking search

- ◇ Selection heuristics
 - most constrained variable
 - most constraining variable
 - least constraining value

- ◇ Pruning heuristics
 - forward checking
 - constraint propagation
 - arc consistency

- ◇ problem structure:
 - independent subproblems
 - tree-structured CSPs, conditioning

Chapter 6: Adversarial Search

- ◇ What type of game:
deterministic, turn-taking, 2-player, perfect information, zero sum
- ◇ Game trees, minimax values
- ◇ Alpha-beta pruning
- ◇ Depth-bounded search, static evaluation functions
- ◇ Node ordering
- ◇ Nondeterministic game trees (e.g., backgammon)
expectiminimax

Section 17.6: Game theory

- ◇ Strategies
 - pure (deterministic) and mixed (probabilistic)
- ◇ Dominant strategy equilibria
- ◇ Nash equilibria
- ◇ Pareto optimal equilibria
- ◇ Examples: Morra, Prisoner's Dilemma, etc.
- ◇ Iterated Prisoner's Dilemma (IPD)
- ◇ You don't need to know about poker, kriegspiel, or the DBS program