Last update: March 9, 2010

Review for the Midterm Exam

CMSC 421: Midterm Review
Midterm Exam

◊ Scope: Chapters 1–6, and Common Lisp
   The test won’t include Chapters 7 and 8

◊ Open book, open notes

◊ No electronic devices

My exams can sometimes be 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:

<table>
<thead>
<tr>
<th>Midterm</th>
<th>Final</th>
<th>GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>62%</td>
<td>64%</td>
<td>2.88</td>
</tr>
</tbody>
</table>

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

It also has the answers to the first two homework assignments
Later today, I’ll post the answers to the third one
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

I probably won’t ask much about Chapter 2
Chapter 3: Search

◊ Problem types:
  deterministic, nondeterministic,
  fully observable, partially observable, non-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
Chapter 4: Informed Search and Exploration

♦ Heuristic search algorithms
  Greedy search
  A* on trees or on graphs with consistent heuristics
  A* on graphs with inconsistent heuristics

♦ Heuristic functions
  admissibility
  consistency
  dominance
  problem relaxation

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

♦ Not on the exam:
  IDA*
  sections 4.4 (continuous spaces) and 4.5 (online search)
Common Lisp

◊ lists, atoms, list notation
◊ defining your own Lisp functions
◊ built-in Lisp operators (functions, predicates, special forms, macros)
◊ recursion, loops, and mapping functions
◊ passing functions as arguments
◊ operators for sequences (lists, vectors, strings)
◊ good programming style
   (no direct questions on this, but don’t write sloppy code!)

◊ Not on the exam:
  • destructive operations (e.g., setf, nconc)
    versus nondestructive operations (e.g., setq, append)
  • the xkcd comics 😈
  • interacting with the debugger
Chapter 5: Constraint Satisfaction

♦ Definition: variables, constraints
♦ Representation: constraint graphs
♦ Backtracking search

♦ Variable selection heuristics:
  - MRV (minimum remaining values)
  - degree (most constraints on remaining variables)

♦ Value selection heuristic: least constraining value

♦ Pruning techniques
  - forward checking
  - arc consistency (constraint propagation)

♦ Problem structure:
  - independent subproblems
  - tree-structured CSPs
  - cutset conditioning
Chapter 6: Adversarial Search

♦ What type of game:
  two-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