Artificial Intelligence – Exam I Outline – Fall 2018

The following topics will be covered on the exam.
The exam will be closed-book and closed-notes.

Introduction
- Definition of AI
- Four approaches to AI
    - Acting humanly
    - Thinking humanly
    - Thinking rationally
    - Acting rationally
- Turing test

Intelligent Agents
- Definition of agent, percept, action, rational agent
- PEAS description of task environment
    - Performance, Environment, Actuators, Sensors
- Task environment properties
    - Fully vs. partially observable
    - Single vs. multi-agent
    - Deterministic vs. stochastic
    - Episodic vs. sequential
    - Static vs. dynamic
    - Discrete vs. continuous
    - Known vs. unknown
- Types of agents
    - Reflex
    - Model-based
    - Goal-based
    - Utility-based
    - Learning: critic, learning element, problem generator
- Wumpus world

Search
- Five parts of search problem
    - Initial state, actions, transition model, goal test, path (step) cost
    - Examples: 8-puzzle, wumpus world, maze
- State space, search tree, search graph, path, frontier
- Tree search vs. graph search
- Performance: completeness, optimality, time and space complexity
- Branching factor
- Uninformed search (know algorithm and performance for each)
    - Breadth-first, Uniform-cost, Depth-first, Depth-limited, Iterative deepening depth-first, Bidirectional

- Informed search (know algorithm and performance for each)
    - Greedy best-first, A*
- Heuristic functions
    - Admissible, dominating
    - Effective branching factor
    - Designing good heuristics
    - Heuristics: city-block (Manhattan), straight-line (Euclidean)
- State space properties: plateau, ridge, local maximum, global maximum
- Local search (know algorithm)
    - Hill climbing (stochastic, random-restart)
- Adversarial search
    - Game tree
    - Minimax (know algorithm and complexity)
    - Alpha-beta pruning (know algorithm)
    - Move ordering
    - Timed games: cutoff test, horizon effect
    - Stochastic games: chance nodes, ExpectiMinimax
    - Partially-observable games
    - Games: tic-tac-toe, checkers, chess, go, backgammon, poker