# CS 182 Exam 1 - Important Terms and Concepts

October 25, 2018

The terms and concepts below are meant to be a resource for the midterm. They are **not exhaustive**, and not all topics will necessarily be covered.

## 1 Search

State, actions, start state, goal state
Cost/reward model, transition model
Informed and uninformed search
Breadth-first search (BFS)
Depth-first search (DFS)
Depth-first search with iterative deepening (DFS)
Uniform-cost search (UCS)
Greedy search
A-star search
Algorithm fringe/frontier
Algorithm space complexity, time complexity, corresponding data structures
Tree search vs Graph search
Heuristic function
Admissibility and consistency
Standard search problem vs adversarial search
Deterministic game
Minimax
Expectimax
Alpha-beta pruning

## 2 Constraint Satisfaction Problems

Values, variables, domains, constraints
Constraint graph
Backtracking search
Filtering vs ordering (improvements of backtracking)
Constraint propagation
Forward checking
Arc consistency (and AC-3)
Path consistency
K-consistency
Minimum remaining values heuristic
Least constraining value heuristic
Tree-structured CSP
Cutset conditioning
Iterative min-conflicts

## 3 Local Search and Optimization

Mathematical optimization algorithms
Convex, concave, non-convex function
Local vs global maxima/minima
Hill climbing
Beam search
Simulated annealing (and temperature)
Genetic/evolutionary algorithms
Gradient descent

## 4 Markov Decision Processes

State, actions, start state, terminal states
Cost/reward model, transition model
Markov assumption
Bellman equations/updates
Q-state
Value function (and optimal value function)
Q-value function (and optimal Q-value function)
Policy (and optimal policy)
Discounting and discount rate
Finite vs infinite horizon
Value iteration
Policy evaluation
Policy extraction
Policy iteration

## 5 Reinforcement Learning

Offline vs online planning
MDPs vs RL problem formulation
On-policy vs off-policy
Passive vs active RL
Model-based vs model-free learning
Monte Carlo (Direct Evaluation)
Temporal Difference (TD) Learning
Q-learning
Approximate (feature-based) Q-learning
Learning rate
Exploration vs exploitation
Epsilon-greedy action selection
Exploration function
Regret