

CS161: Fundamentals of Artificial Intelligence

Spring 2020 - Final Study Guide

Date/Time

We will have our final at **11:30 am ~2:30 pm PDT on Monday, June 8.**

To accommodate students in different time zones, we will have a second final at **8:00 pm ~11:00 pm PDT** on the same day.

You will be in the same group as you chose for the midterm by default. That is, if you are in the 10 am group in the midterm, you will be assigned to the 11:30 am group in the final. If you would like to switch to another group, please contact your TA.

Form

- The final will entirely consist of **true/false and multiple-choice** questions. They will still require that you solve more open-ended exercises (as on the midterm) before answering a multiple-choice question.
- The exam is open book and open note, but no internet. Electronic notes are ok.

Topic list

The final will be cumulative, so content before midterm will be covered too but the focus will be on material covered after the midterm.

The final will be about the following topics:

Lisp and search strategies

1. Evaluate a simple LISP expression or function, or choose a sentence to complete it.
2. Understand differences among search algorithms and determine completeness, optimality, time, and space complexity for any of them.
3. Understand backtracking DFS and heuristics (variable order, value order, etc.) in constraint satisfaction problems.
4. MINIMAX and α - β pruning.

Propositional logic (PL) and first-order logic (FOL)

5. The concepts in PL and FOL, e.g. satisfiability, validity, entailment, consistency.
6. Translate English to FOL sentences, or the other way around.
7. Convert a propositional or first-order logic sentence to CNF. Perform Skolemization.
8. Apply resolution or other inference rules to PL/FOL sentences. Completeness and soundness of inference rules.

9. Find unifiers for two FOL sentences.
10. Decide whether a propositional or first-order sentence entails another sentence.

Reasoning over uncertainty

11. Independence, conditional independence. Bayes rule.
12. Given background information, compute probabilities for events.
13. Compute probability for PL sentences given possible worlds.

Bayesian Network

14. Model a problem as a Bayesian network.
15. Identify Markovian assumptions encoded by a Bayesian network (its semantics). Give joint probability using the chain rule.
16. Utilize d-separation to identify independence.

Machine Learning

17. Concepts about Machine learning. Supervised learning and unsupervised learning.
18. Definition for Entropy. Choose splitting attributes for a decision tree.
19. Concepts about Neural Network. Given input and NN structure, predict output.