

Guide for Midterm Exam

Com S 472/572

Fall 2020

The midterm exam will be given out on Canvas for the 2-hour period of **10:30am - 12:30pm** on **Monday Oct 5th**. This period covers the regular class time of 11:00-11:50am but extends backward and forward by 30 and 40 minutes, respectively. Nevertheless, the exam will be designed to take about the **same amount of effort** that it would require if it were to be taken as a 50-minute exam in the classroom.

- On Monday Oct 5th at 10:30am, you will retrieve the midterm exam on Canvas under Assignments -> Midterm Exam.
- The exam file will be out in two formats: .pdf and .pptx.
 - You may work on the .pptx file directly, typing in your answers and drawing figures.
 - Submission can be made in either .pdf or .pptx format.
 - If using PowerPoint, you do not need to typeset math symbols and equations within the Equation environment. Just plain text with no font preference. For example, $x + 2y = 3$. Also, don't bother with subscripts: A variable a with a subscript 1 can be simply typeset as a_1 as long as there's no ambiguity. Similarly, $n \log n$ would be interpreted as the product of n with its logarithm.
 - Or, you may write up an answer by hand if it involves equations and math symbols, and then simply insert a picture of your answer into PowerPoint.
- You may print out a copy and write down your answers by hand. Pay attention to the following if you do so:
 - Scan your answer sheets and submit them in a .pdf file.
 - Be sure to scan the **first page** which shows your name and a scoring table.
 - You need only scan the remaining pages that show your answers.
 - You may also choose to write down all your answers on separate blank sheets for scanning. (Check that the problem numbers are correct for your answers.)
 - Please double check to make sure you haven't omitted any page with your writing before submission.
- Submission must be done **before 12:30pm**, after which the submission link will disappear.
- Multiple submissions will be allowed but only the **latest version** will be graded.

In the case that the exam time does not work for you due to a conflict or some other issue, please contact the instructor (jia@iastate.edu) **no later than Tuesday Sep 29**.

The following rules apply to the exam:

- The exam will be **closed-book** and **closed-notes**.
- **No online search** for information that may help you answer the questions.
- **No discussion in any form** with others during the exam.

We trust your integrity, as we all understand that any violation by exploiting the situation with no proctoring would be such a **shame**.

According to the syllabus, the exam is weighted 20% (for Com S 472) and 18% (for Com S 572) of the overall grade. The scope of the exam includes the following topics (Chapters 1-7):

- **Agents:** definition, the vacuum-cleaner world, rational behavior, performance measure, PEAS specification, task environment properties, and agent architecture and taxonomy.
- **Uninformed search:** problem formulation, state space, search trees, graph search, best-first search, BFS, DFS, depth-limited search, iterative deepening search, bi-directional search, and comparisons of search strategies.
- **Heuristic search:** greedy search, A* algorithm, weighted and iterative deepening A*s, recursive best-first search, heuristic functions, admissibility, effective branching factor, comparison between heuristics, and generation of heuristics.
- **Search in complex environments:** local search, hill climbing, simulated annealing, temperature, local beam search, genetic algorithms, nondeterminism, conditional plan, AND-OR tree search, belief states, their transition model, and prediction-update cycles.
- **Games:** formal definition, state space graph, minimax search, alpha-beta pruning, heuristic alpha-beta tree search, evaluation functions, Monte Carlo tree search, stochastic games, and expectiminimax.
- **Constraint satisfaction:** definition, assignments, solutions, map coloring, job shop scheduling, disjunctive and linear constraints, arc and path consistencies, bounds propagation, commutativity of CSP, backtracking, MRV and degree heuristics, forward checking, local search, min-conflict heuristics, tree structure, cutset conditioning, and tree decomposition.
- **Propositional Logic:** Knowledge base, inference, syntax and semantics of propositional logic, entailment vs derivation, soundness, completeness, truth tables, model checking, logical equivalence, satisfiability, monotonicity, resolution, resolvent, conjunctive normal form, refutation, resolution tree, and the resolution algorithm.