1. Final exam outline:
   - (4 points) Master theorem
   - (4 points) Knapsack
   - (4 points) Formulating problems as graph reachability.
   - (4 points) Formulating linear programs.
   - (5 = 2 + 3 points) NP-hardness
   - (4 points) approximation algorithm
   - (5 points) bonus that’s intended to take the second half (1.5 hours) of the exam.

2. Logistics for final exam:
   - Time 11:30am - 2:30pm Friday Dec 9.
   - Location: Klaus 1456, same as class room.
   - Allowed crib sheet: 1 sheet, both sides.
   - Pizza: discuss on piazza.

3. NOT included (this is only relating to the topics listed above):
   - Guess and check for bounding runtime recurrences.
   - Minimizing a maximum / maximizing a minimum as linear program objectives.
   - Linear program standard forms: you can express solutions as any set of linear inequalities / equalities.
   - Flows on graphs. Distances / weights, on the other hand, are fair game.
   - Prior knowledge of NP-complete problems. The reduction problem will specify / define the problems to reduce from/to.
   - Ways beyond binary search of using an algorithm for a decision problem to solve an optimization / solution recovery problem.

4. Master theorem:
• Lectures Aug 24, Aug 26.
• Textbook 2.2.
• Test 1, Question 1.
• Homework 1, Questions 2(a) and 2(c).
• Textbook Exercises 2.5 (a) - (f).

5. Knapsack
• Lectures Oct 12, Nov 30.
• Textbook 6.4.
• Test 3, Question 1.
• Homework 3, Question 4.
• Textbook Exercises 6.17, 6.18, 6.19.

6. Graph reachability
• Lectures Sep 12, Sep 14, Oct 3.
• Textbook 3.1. (Note: the course did not cover depth-first search).
• Test 2, Question 3.
• Textbook Exercises 3.7, 3.8, 3.11, 3.13, 3.17, 3.21, 3.22.

7. Formulating linear programs
• Textbook 7.1.
• Test 4, Question 1.
• Homework 4, Question 1. Homework 5, Question 1.
• Textbook Exercises 7.2, 7.3, 7.4, 7.5, 7.8 (without the ‘solve the program’ parts).

8. NP-completeness proofs
• Lectures Nov 14, Nov 16, Nov 18, Nov 21, Nov 28.
• Textbook 8.1 - 8.3.
• Homework 5, Question 2.
• Textbook Exercises 8.1, 8.2, 8.3, 8.4, 8.5. (Note: the textbook refers to Hamiltonian Tour as Rudrata Tour).
9. Approximation Algorithms

- Lectures Nov 21, Nov 30.
- Textbook 9.2.
- Homework 5, Question 3.