## Summary

<table>
<thead>
<tr>
<th>Unit 0</th>
<th>Review as needed to get ready for class</th>
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<tbody>
<tr>
<td>Practice</td>
<td>Videos: Course designer video introduction, Binary example, Interactive questions, Doubling search, Doubling search pseudocode, Animation of recursive merge sort, Reading: Section 2.2 of Algorithms by Sedgewick and Wayne, Practice: play Robozzle, after getting used to the game try puzzles 330, 536, 656, and 1033,</td>
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<table>
<thead>
<tr>
<th>Unit 1, Week 1 (3/31 - 4/6)</th>
<th>Is it correct? (by induction)</th>
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<tbody>
<tr>
<td>Assigned P0, D1.1</td>
<td>Reading: JEL &quot;98 Introduction&quot;</td>
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<tr>
<td>Assigned Coursework:</td>
<td>Project0 (TEACH access) assigned, Discussion-based questions D1.1, Question 1: water-gun induction, Question 2: internal nodes and leaves,</td>
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<tr>
<th>Unit 1, Week 2 (4/7 - 4/13)</th>
<th>Is it correct? (by contradiction)</th>
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<tr>
<td>Assigned D1.2</td>
<td>Reading: Section 5.1 of DPV, Interactive Tutorial: Contradiction, Video: MST correctness, Video: Boruvka algorithm,</td>
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<tr>
<td>Assigned Coursework:</td>
<td>Discussion-based practice questions 1.2, Question: unique MST, Question: question 5.9 from DPV (on page 162 of Chapter 5 of DPV),</td>
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<tr>
<th>Unit 2, Week 3 (4/14 - 4/20)</th>
<th>Run-time Analysis</th>
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<tr>
<td>Assigned P1, D2</td>
<td>Project 1: Max Subarray, due: 4/27,</td>
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### Unit 3, Week 4 (4/21-4/27)  
**Recurrence Relations and Divide and Conquer**

**Assigned D3**

- **Video:** Plotting in Matlab ? loglogplots,  
  File created: loglogplots.m
- **Reading:** Chapter 0 of DPV,  
  Khan Academy: Logarithms,  
  Interactive Tutorial: Big Oh, Summary of Asymptotic Notation,  
  **Video:** big-Oh vs. big-Theta,
- **Assigned Coursework:**
  - Discussion-based practice questions 2,  
  - Question: Show \( \log(n!) = \Theta(n \log n) \),  
  - Question: Show \( \sum_{i=1}^{n} \frac{1}{n} = \Theta(\log n) \),

### Unit 4, Week 5 (4/28-5/4)  
**Dynamic Programming**

**Assigned P2, D4**

- **Video:** Make Postage Recurrence,  
  **Video:** Binary Search Recurrence,  
  **Reading:** JEL 1.5-1.8,  
  **Video:** Recursive Multiplication,  
  Khan Academy: Computing a Geometric Series,  
  Interactive Tutorial: Power Series  
  **Video:** Finishing Up Recursive Multiplication,  
  Interactive Tutorial: General Recurrence,
- **Assigned Coursework:**
  - Discussion-based practice questions 3,  
  - Question: 2.5 from DPV (on p83 of Chapter 2 of DPV),  
  (All of the parts, rather than just parts a and b)  
  - Questions related to STOOGESORT,  
  - Question about some binary tree orderings,  
  - Question related to Tree-ify (pre, post) algorithm,  
  - Anything else to say about Project 1?

### Exam 1

Be sure to schedule your first exam for sometime during week 5!

### Unit 5, Week 6 (5/5-5/11)  
**Linear Programming**

**Assigned D5**

- **Video:** Introduction to DP Video,  
  Interactive Tutorial: Fibonacci DP,  
  **Read:** DPV Chapter 6 (section 6.2),  
  Interactive Tutorial: Longest Increasing Sequence,  
  **Video:** LIS Run Time Top Down,  
  **Read:** DPV Chapter 6 (section 6.4),

- **Assigned Coursework:**
  - Discussion-based practice questions 4,
  - Question about longest increasing subsequence,  
  - Question about modified knapsack,  
  - Question about dynamic programming for a specific task,

### Exam 2

Be sure to schedule your second exam for sometime during week 6!
Interactive Tutorial: Simple LP,  
Reading: Bicycle-Problem PDF,  
Video: Bicycle Problem Setup,  
Video: Bicycle Problem Matlab,  
Video: Bicycle Problem Polyhedron,  
Reading: Section 7.2 of DPV,  
Video: Shortest Paths LP,  

Assigned Coursework:  
Discussion-based practice questions 5,  
Consider a couple problems (problems 1 and 2),  
Exercise 7.2 in Algorithms (problem 3 on the forums),  
Exercise 7.29 in Algorithms (problem 4 on the forums),  

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<th>Unit 6, Week 7 (5/12-5/18)</th>
<th>Computational Complexity: Complexity classes</th>
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| Assigned P4, D6.1         | Video: Intro to Complexity,  
Reading: Undecidable Problems,  
Reading: An Undecidable Problem, the Halting Problem,  
Reading: Story of Sissa and Moore-Chapter 8 of DPV,  
Interactive Tutorial: Polynomial Time and Exponential Time,  
Reading: Sorting Lower Bound-Chapter 2 of DPV,  
Video: Sorting Lower Bound,  
Video: Non-Determinism, Certificates, NP and P vs NP,  
Video: Overview of P, NP, computable, TM, etc-Venn diagram,  

Assigned Coursework:  
Discussion-based practice questions 6.1,  
Exercise 2.2 in DPV,  
Show that some problems are in NP,  

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<tr>
<th>Unit 6, Week 8 (5/19-5/25)</th>
<th>Computational Complexity: NP-completeness and reductions</th>
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| Assigned D6.2             | Video: A working definition of NP-hard,  
Reading: Section 29.3 and 29.5 of JEL,  
Video: Reduction,  
Interactive Tutorial: Decision Search Optimization,  
Reading: DPV Chapter 8,  
Interactive Tutorial: NP v NP-hard,  
Video: TSP is NP-hard,  

Assigned Coursework:  
Discussion-based practice questions 6.2,  
Question about Experimental cuisine,  
Exercise 8.10 in DPV,  

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<tr>
<th>Unit 6, Week 9 (5/26-6/1)</th>
<th>Computational Complexity: Project four: TSP</th>
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| Assigned Finish TSP       | Complete work on unit 6 materials,  
Complete TSP project,  

Week 10 (6/2-6/8) Review and complete project four (TSP)  

Assigned: Study for exam  
Discuss topics, discussion questions and projects,  
Alterations to TSP might be allowed,  

Assigned Finish TSP  
Complete work on unit 6 materials,  
Complete TSP project,  

Week 10 (6/2-6/8) Review and complete project four (TSP)  

Assigned: Study for exam  
Discuss topics, discussion questions and projects,  
Alterations to TSP might be allowed,