EECS 3101 Tutorials Fall 2018

This is a summary of what we have discussed during the tutorials so far.

(The light colored text is from the previous years.)

- Sep. 6:
  - Completed LS1.
  - LS1, p. 26: The # disk moves by Towers of Hanoi Algorithm is 2^n-1. Why is this optimum? Proof by mathematical induction.
  - LS1, Exercise 6(a) [Red-Blue Towers of Hanoi with 3 stacks] recursive solution discussed. Part (b) [R-B TH with 4 stacks] may be discussed in the next tutorial.

- Sep. 13:
  - LS1, Exercise 12: Queen Josephine's Kingdom. Proof by induction.
  - Why is $\log(n!) = \log 1 + \log 2 + \ldots + \log n = \Theta(n \log n)$? Summation by parts. (Application of ASSUME later. See summary Table on page 22 of LS3)
  - LS2, Exercises 2(f, g) and 3: Asymptotic relationships.
  - LS3, Exercise 1(b, l): Time analysis of double-loop iterations.

- Sep. 20:
  - LS3: Summations & Recurrence Relations.
  - Exercises 7(n), 9, 12(f). [Sections A and E]
  - Exercise 13. [Section A]
  - Exercises 3(a), 6(b). [Section E]

- Sep. 27:
  - LS4: Iterative Incremental Algorithms.
  - Optimization Problem: (1) feasibility criteria; (2) objective value; (3) optimum solution = any feasible solution with optimum objective value.
  - Exercise 4: Transform it to the LSS problem discussed in class.
  - Exercise 6(a): explained in detail.
  - Exercises 6(b) and 6(c): see the posted sample assignment 2 and one of the sample midterms.
  - Exercise 9(a): 2SUM (idea: how to implicitly "merge two sorted arrays") in O(n) time.

- Oct. 4:
  - Exercise 9(b): 3SUM (idea: n invocations of 2SUM) in $O(n^2)$ time. Problem: Given n points in the plane, are any three of them collinear? Discussed this problem and its time complexity at some length.
  - Assignment 2, Problem 2 (LS4, Ex. 17(e)): problem statement explained and examples given.
  - LS4, Exercise 16. The importance of properly strengthening recursive pre- or post-conditions.
  - LS4, Exercise 13. [section A]

- **Oct. 18: Midterm Review Session**
  - Discussed the logistics of the midterm test.
  - LS5, page 127: The adversary lower bound argument for median finding explained again.
    LS5, Exercise 8. [section A]
  - LS5, Exercises 4 and 6.

- Nov. 1:
  - LS5, Exercise 6(c): main idea explained. Click *here* for a complete solution.
  - LS5, Exercise 16: solution explained with a new data structure.
  - Dynamic Programming (LS7) versus Greedy (LS6):
    DP solution of Coin Change Making even if the coin system is not Regular.

- Nov. 8:
  - LS8: Completed the lecture on BiConnected Components algorithm.
  - LS7, Exercise 28: a card game against Elmo: Greedy versus DP.

- Nov. 15:
  - LS8, Exercises 4, 15, 17, 28.

- Nov. 22:
  - LS8, page 162: Graph matching augmenting path theorem explained again.
  - LS8, Exercises 48, 69.

- **Dec. 3: Final Course Review Session.**
  - We discussed the format of the final exam.
  - We reviewed a number of topics and exercises on dynamic programming, graphs, and NP-completeness.

The end.