Assignment 7

CS 350
Due: December 2, 2019

> Your solutions must be typed (preferably typeset in LATEX) and submitted as a
> hard-copy at the beginning of class on the day its due. The answers that you
> provide should clearly demonstrate that you understand the assignment and
> should provide enough information to clearly explain your solution to a peer.

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1 Interval Scheduling

Consider the following problem:

> Given a set $S = \{(s_i, f_i) \mid s_i < f_i\}$ where s_i and f_i represent the start and finish times
> of intervals over the real number line. Find the maximum cardinality subset S' of S
> such that no pair of intervals in S' overlap.

For each of the following greedy strategies decide whether the strategy produces an optimal so-
lution. If it does, give a proof that it is correct and describe what data structures and preprocessing
you would use to give an efficient solution. If it is not correct, give a counter-example showing the
strategy is incorrect and still give a description of an efficient implementation, as a heuristic. (Note:
no pseudocode is required for this assignment.)

(a) [10 points]   Repeat until S is empty: Select the interval I that overlaps the fewest number
of other intervals. Add I to the final solution S'. Remove all intervals from S that overlap with I.

(b) [10 points]   Repeat until S is empty: Select the interval I with the minimum f_i, i.e. the
earliest finish time. Add I to the final solution S'. Remove all intervals from S that overlap with
I.