

CS577 Assignment 3

Due on Thursday 6/28

1. There are n tasks to be scheduled with each task i takes a running time of t_i . *Note that the tasks can be scheduled any time as it does not have start time or end time constraints.* If the objective is to maximize the number of tasks to be scheduled with a given period of time, please
 - a. Illustrate the greedy algorithm that schedules the shortest task first and prove that it is optimal.
 - b. Provide analysis on the computing complexity of the greedy algorithm used.
2. Suppose you were to drive from Madison to Rapid City (Black Hills), South Dakota along I-90. Your gas tank when full holds enough gas to travel m miles and you have a map that gives distances between gas stations along the route. Let $d_1 < d_2 < \dots < d_n$ be the locations of all the gas stations along the route where d_i is the distance from Madison to the gas station i . You can assume that the distance between neighboring gas stations is at most m miles.
Your goal is to make as few gas stops as possible along the way. Give a greedy algorithm you can find to determine at which gas stations you should stop and prove that your strategy yields an optimal solution.
3. Chapter 4 Question 6 (page 191). Note that you should:
 - a. Design a greedy algorithm
 - b. Prove its optimality using an exchange argument.
 - c. Analyze the computing complexity of your algorithm.

Hint: You might want to work out a small example to help you develop the algorithm. Work with the example to propose a greedy rule and see if it gives the correct answer. Refine the example if necessary to see if you can break your greedy rule.