

Homework 9

CS/ECE 374 B

Due 8 p.m. Tuesday, December 3

- Remember that if you use a greedy algorithm, you must prove that it will always arrive at an optimal solution
- Not all the questions in this set can be solved with a greedy algorithm.
- Make sure that you analyze your algorithms complexity and that your algorithms are efficient; solutions slower than the reference solution will lose points.

Question 1: Fueling Up.....

- (a) You are driving along a highway with refueling stations. Each station is at distance $D[i]$ from your starting point. Your car holds enough gas to travel up to 100 miles before refueling. Assume that you start out with an empty tank, but there is a refueling station at your starting point (i.e., $D[0] = 0$). Assume, likewise, that there is a fueling station at your destination, $D[n]$. Design and analyze an efficient algorithm that computes the minimum the number of refueling stops you have to make to reach your destination, or return ∞ if this is impossible.
- (b) Now suppose that you have a choice of routes to get to your destination. The road network is represented as an undirected graph $G = (V, E)$ with weighted edges representing road segments. Fueling stations are located at some of the crossroads (i.e., vertices), so each vertex has a flag to specify whether it contains a fueling station or not. Design and analyze an efficient algorithm to compute the minimum number of refueling stops you have to make to travel from a given source s to a destination d . Again, your car can travel up to 100 miles before refueling, and you can assume that both s and d have a refueling stop at them.

Question 2: Zapping Balloons

Solve question 25, parts (a), (b), and (c), from chapter 4 in the textbook. Do not solve part (d).

Question 3: Stacking Books

Solve question 21, parts (a), (b), and (c), from chapter 4 in the textbook.