Homework 2: Greedy Algorithms

1. Suppose you and your friends need to drive across the country. You want to drive as much as you can during the day, but decide that you will rest every night. You’ve identified a list of suitable sleeping points along the drive and need a system for determining when to stop each evening. You decide to use a greedy approach. Design a greedy algorithm that minimizes the number of stops necessary for the trip.

To formalize this problem a bit, consider the following definitions / assumptions:

1. You may imagine the drive as a long straight line segment of length L and assume you can always drive at most d miles per day.

2. You can assume the stopping points are located at (x1, x2, x3, ..., xn). You can also assume that the distance between every two successive stops is less than or equal to d.

3. You can assume that you are perfect at determining whether or not you can make it to the next stop in time.

Every day, you travel to the furthest sleeping point that is less than or equal to d miles from the current position when you wake up.

2. Prove that your algorithm always finds the optimal solution.