

CS 182
Advanced Topics in Algorithms
Spring 2003
Problem Set 5a
Due Thursday, February 20

1. **[20 Points] The Absent-Minded Professor.** Professor Juan I. Dalean of the Massachusetts Institute of Technology walks out of his building one evening. Unfortunately, he can't remember if he parked his car up the street or down the street. He wishes to use an online algorithm to find his car which is competitive with an optimal offline algorithm.

More precisely, imagine that Professor Dalean is currently at a given point on the line (the street). The car is parked someplace on the line some finite distance away from Dalean. An optimal offline algorithm would know the location of the car and would proceed directly there. An online algorithm doesn't know the position and must therefore search for it. The online algorithm is k -competitive if it eventually finds the car and traverses a distance no larger than k times the distance traversed by the offline algorithm.

Find a competitive online algorithm for this problem and carefully show that competitive ratio is 9.