CSE 347 Analysis of Algorithms January 28, 2019

Homework 2

Instructor: Brendan Juba *Due: February 4, 2019, 11:59 PM*

Reminder: You may work in groups and use outside sources. But, you must write up solutions in your own words and properly reference your sources for each problem. This includes listing your collaborators and properly citing any sources you use. Solutions to each problem must be electronically typeset and submitted online via Gradescope. Instructions appear in the E-Homework Guide: `http://www.cse.wustl.edu/~bjuba/cse347/s19/ehomework/`

1. The Missouri Department of Transportation has decided to plant wildflowers alongside Interstate 64 between St. Louis and Kansas City. MODOT has bid out the job and received n proposals. Say that St. Louis is at mile 0 of the interstate, while Kansas City is at mile D. Proposal p_i offers to plant flowers over a (fixed) interval $[s_i, e_i)$ of the highway, $0 \leq s_i \leq e_i \leq D$, for a fee of c_i dollars ($c_i \geq 0$ of course).

   For political reasons, MODOT cannot accept only part of a proposal, so the endpoints s_i and e_i of each proposal are fixed. However, it *can* accept two proposals that overlap, since that simply results in some parts of the highway having more flowers.

   Give a polynomial-time algorithm to choose a subset of the proposals sufficient to plant flowers along the entire route from St. Louis to Kansas City, while minimizing the total cost.

2. *Kleinberg & Tardos* Chapter 6, question 16

3. *Kleinberg & Tardos* Chapter 4, question 14