

EECS 454
Analysis of Algorithms
2006 Spring Semester

Homework 5

Due on April 7, 2006
No late papers accepted

1. **Linear programs with consecutive 1's in the rows.** Consider a linear program

$$\begin{array}{ll} \min & \mathbf{c}^T \mathbf{x} \\ \text{s.t.} & \mathbf{A}\mathbf{x} \geq \mathbf{b} \\ & \mathbf{x} \geq 0 \end{array}$$

where A is a 0-1 matrix with the property that all of the 1's in each row appear consecutively (that is, with no intervening 0's) and \mathbf{b} is an integer vector. Show that there exists an optimal integer solution to this linear program for all cost vectors \mathbf{c} .

2. Solve problem 5.3-4, page 105 in CLRS.
3. Let r be the number of levels in a random leveling of a set S of size n . Prove that $E[r]=O(\log n)$.