

Algorithms, Fall 2021 at CIS – Homework 4

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Problem 1

Suppose you have an LP $\max c^T x$ subject to $Ax \leq b$ and $x \geq 0$ where A has 2 rows and n columns. Further, suppose this LP is feasible and bounded. Show how to find the optimal objective function value in an expected $O(n)$ time.

Problem 2

Suppose you are running Seidel's algorithm in 2 dimension and there are i constraints and the current optimum is at point p , and one of the i constraints is randomly removed. What is the tightest upper bound on the probability that the optimum point changes because of this?

Problem 3

Compute the dual of $\min 9x_1 - 3x_2$ subject to $x_1 - 2x_2 \geq 2, x_1 + 4x_2 \leq 1, x_1 \geq 0, x_2 \geq 0$.