

Problem Set 9

CS 331

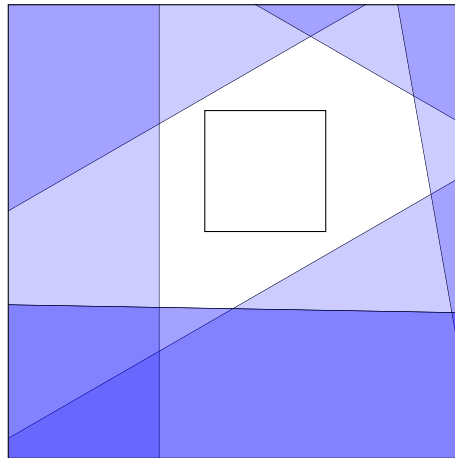
Due Wednesday, April 29

1. Work through the Jupyter notebook on the class website.
2. Suppose we are given a sequence of n linear inequalities of the form

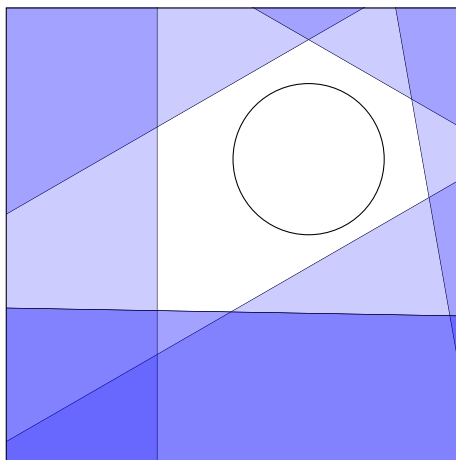
$$a_i x + b_i y \leq c_i.$$

Collectively, these n inequalities describe a convex polygon P in the plane.

- (a) Describe a linear program whose solution describes the largest axis-aligned square that lies entirely inside P . (“Axis-aligned” means that the edges are horizontal and vertical.)



- (b) Describe a linear program whose solution describes the maximum-perimeter axis-aligned rectangle that lies entirely inside P .
- (c) Describe a linear program whose solution describes the largest circle that lies entirely inside P .



- (d) Describe a polynomial-time algorithm to compute two interior-disjoint axis-aligned squares with maximum total perimeter that lie entirely inside P . [Hint: There are exactly two interesting cases to consider; for each case, formulate a corresponding linear program.]

