

Math 4990 Problem Set 5*Due Tuesday, Oct 7, 2014 in class*

Please refer to previous problem sets for instructions, including but not limited to the collaboration policy.

ASSIGNMENT

Liberally peruse **pages 59–63** of [DO].

[DO] Exercises 3.2, 3.3, 3.4, and 3.7.

Problem 5. Prove that a polygon of perimeter p can be covered by a disc of diameter $p/2$.

Problem 6. Recall this corollary of Helly theorem, stated in class:

Let $A \subset \mathbb{R}^2$ be a fixed convex set and let $X_1, \dots, X_n \subset \mathbb{R}^2$ be convex sets such that every three of them intersect a translation of A . There exists a translation of A that intersects all sets X_i .

For each i , let $Y_i = \{y \in \mathbb{R}^2 : (A + y) \cap X_i \neq \emptyset\}$. In order to apply Helly theorem to obtain the corollary, show that the Y_i are convex.