

Problem Set I, MAT 382, Fall 2020

Due September 28, 2020

Read Chapters I, II and III, from the text book.

1. Chapter I: Exercise 13.
2. Chapter II: Exercises 5, 11, 13, 26.
3. Chapter III: Exercises 3, 9, 11, 13.
4. Show that the group of symmetries of a regular dodecahedron is A_5 .
5. Consider the Cayley graph Γ for \mathbb{Z}^2 with generating set $\{(5, 3), (3, 2)\}$. Describe the ball of radius 3 in Γ centered at the origin. (Bonus: What does the ball of radius n look like for large values of n ?)
6. Consider \mathbb{R}^2 equipped with the sup metric. For a pair of points $(a, b), (c, d) \in \mathbb{R}^2$ describe the set

$$\left\{ (x, y) \in \mathbb{R}^2 \mid \text{there is a geodesic connecting } (a, b) \text{ to } (c, d) \text{ passing through } (x, y) \right\}$$