Due: Wed. Sept 27

HMC Math 142 Fall 2021

Prof. Gu

Problem Set 3

Start this assignment before Sunday night!

Read:

- Baby Do Carmo, Differential Geometry of Curves and Surfaces: Sections 1-6, 1-7, Chapter 1
- Handout 3
- Lecture Notes

Do:

A: Problems on Reviewing of Orthogonal transformations, Rotations, Reflections and Rigid Motions in R^n.

- a) Let ρ and τ be two orthogonal transformations on an Euclidean space $(V^n, <, >)$. Prove that the composition of ρ and τ is again an orthogonal transformation of $(V^n, <, >)$. So is the inverse of ρ.
- b) Problem 6 on page 23, Section 1-5, Baby Do Carmo.

B: Problems from Lectures

- a) Show SO(n) is a group with respect to the usual matrix multiplication. (Later, we will see that SO(n) is in fact a Lie group.)
- b) Show that the mirror reflection τ (as defined in the lecture) is an orthogonal transformation and $\tau^2 = id$, where id is the identity transformation.

C: Other Problems
Choose 2 problems out of following problems:

- a) Problem 3 on page 7, Section 1-3, Baby Do Carmo.
- b) Problem 5 on page 8, Section 1-3, Baby Do Carmo.
- c) Problem 6 on page 8, Section 1-3, Baby Do Carmo.

Choose 3 problems out of following problems:

- a) Problem 1 on page 22, Section 1-5, Baby Do Carmo.
- b) Problem 2 on page 22, Section 1-5, Baby Do Carmo.
- c) Problem 5 on page 23, Section 1-5, Baby Do Carmo.
- d) Problem 12 on page 25, Section 1-5, Baby Do Carmo.

D: Extra Credit Problems

- Problems 7, 8 on page 22-23, Section 1-5, Baby Do Carmo.