Due: Monday October 11

HMC Math 142 Fall 2021

Prof. Gu

Problem Set 5

Start this assignment before Sunday night!

Read:

- Baby Do Carmo, Differential Geometry of Curves and Surfaces: Sections 2-2, 2-3, 2-4 and Appendix (starting on page 118) on A Brief Review of Continuity and Differentiability
- Handouts 6 and 7
- Lecture Notes

Do:

A: Problems on Reviewing of Continuity and Differentiability

- a) Prove the proposition 7 on page 127, Baby Do Carmo.
- b) Prove the proposition 8 on page 129, Baby Do Carmo.
- c) Rewrite Example 11 on page 132 of Baby Do Carmo and explain clearly why the Inverse Function Theorem (page 131) is true only in a neighborhood of a point p.
- d) Show that an infinite cylinder after deleting a vertical line is diffeomorphic to a plane.

B: Problems from Lectures

- a) Use Inverse Function Theorem to give a proof of proposition 2, page 59, Baby Co Carmo.
- b) Use Inverse Function Theorem to give a proof of proposition 4, page 64, Baby Co Carmo.

C: Other Problems

- a) Problem 7 on page 66, Section 2-2, Baby Do Carmo.
- b) Problem 11 on page 66, Section 2-2, Baby Do Carmo.
- c) Problem 1 on page 80, Section 2-3, Baby Do Carmo.
- d) Problem 8 on page 80, Section 2-3, Baby Do Carmo.
- e) Problem 10 on page 81, Section 2-3, Baby Do Carmo.
- f) Problem 12 on page 81, Section 2-3, Baby Do Carmo.
- g) Problem 15 on page 82, Section 2-3, Baby Do Carmo.

D: Extra Credit Problems

- Problem 13 on page 82, Section 2-3, Baby Do Carmo.