Due: Wednesday, April 14

HMC Math 143 Spring 2004
Prof. Gu
Problem Set 8
Start this assignment before Sunday night!

Read:

- Handout on Connections
- Riemannian Geometry by Do Carmo, Chapter 2
- Lecture Notes

Do:

A: Problems on Reviewing Covariant Derivatives on \((\mathbb{R}^3, \text{dot product}) \cong \mathbb{E}^3\).
   a) Prove (2) and (3) of the corollary on page 5 of your Handout on Connections.

B: Problems from Lectures
   a) Why the notion of affine connection is actually a local notion?
   b) Write in your own words for a proof of Proposition 2.2 on page 50, Do Carmo.
   c) Write \(\frac{DV}{dt}\) in terms of Christoffel symbols.

C: Other Problems
   a) Problem 1, page 57, Riemannian Geometry, Do Carmo.
   b) Problem 2, page 57, Riemannian Geometry, Do Carmo.
   c) Problem 4, page 58, Riemannian Geometry, Do Carmo.
   d) Problem 5, page 58, Riemannian Geometry, Do Carmo.
   e) Problem 7, page 59, Riemannian Geometry, Do Carmo.
   f) Problem 8, page 59, Riemannian Geometry, Do Carmo.
D: Extra Credit Problem(s)

a) Problem 9, page 58, Riemannian Geometry, Do Carmo.