Due: Wednesday, Feb 4

HMC Math 143 Spring 2004
Prof. Gu
Problem Set 2

Start this assignment before Sunday night!

Read:

- Handout on Tensor Analysis on Vector Spaces.
- Chapter 2, section 2-2, 2-3, 2-4, Differential Geometry of Curves and Surfaces by Do Carmo.
- Lecture Notes.

Do:

A: Problems on Reviewing of Bilinear Forms and Regular Surfaces

- a) If $\phi$ and $\psi$ are 1-forms in $\mathbb{R}^3$, the wedge product $\phi \wedge \psi$ is a 2-form on $\mathbb{R}^3$ such that

\[
(\phi \wedge \psi)(v, w) = \phi(v)\psi(w) - \phi(w)\psi(v)
\]

for all pairs $v, w$ of tangent vectors in $\mathbb{R}^3$. Prove that $\phi \wedge \psi$ is a skew symmetric 2-form.

- b) Prove the proposition of Change of Parameters on page 70, Baby Do Carmo.

B: Problems from Lectures

- a) Carry out Exercise 1 and Exercise 2 on page 5 and 6 of section 3 on Tensors.
C: Other Problems

- a), b), c), and d) will be handed out in class.