PMATH 465/665: Assignment 2

Due: Wednesday, 12 October, 2011

Suggested problems:

1. Problem 2-1, p. 57.

2. Problem 2-3, p. 57.

3. Problem 3.2., p. 66.

4. Problem 3-1, p. 78.

5. Problem 3-3, p. 79.

6. Problem 3-4, p. 79.

Problems to be handed in:

1. Problem 2-4, p. 58.

2. Problem 2-10, p. 58.

3. *Lie groups.* A *Lie group* is a smooth manifold G that is also a group in the algebraic sense, with the property that the multiplication map $m : G \times G \to G$ and the inversion map $i : G \to G$, given by

$$m(g, h) = gh, \quad i(g) = g^{-1},$$

are both smooth. For examples of Lie groups, see pp. 38-39 of Lee's book.

Show that the *special linear group* $\mathrm{SL}(n, \mathbb{R}) := \{A \in \mathrm{GL}(n, \mathbb{R}) | \det A = 1\}$ is an $(n^2 - 1)$-dimensional Lie group.

4. Problem 3-2, p. 78.