Math 518: HW 10 due Wednesday, November 12, 2014.

1. The lecture notes for October 31 give two definitions of an orientation of M^n on page 2. Prove that (a) implies (b).

2. Consider the 2-torus $T = S^1 \times S^1 = \{(w, x, y, z) \in \mathbb{R}^4 \mid w^2 + x^2 = 1 \quad \text{and} \quad y^2 + z^2 = 1\}$ with the product orientation determined by the standard orientation on S^1. Compute $\int_T \omega$ for

$$\omega = xyz\, dw \wedge dy \quad \text{in } \Omega^2(\mathbb{R}^4).$$

Hint: Use Lee's Proposition 16.8 rather than just the definition of $\int_T \omega$.

3. Let η be the element of $\Omega^2(S^2)$ defined on page 3 of the lecture notes for October 29 which also featured prominently on the last HW.

   (a) Prove that η is the Riemannian area form for the usual round Riemannian metric on S^2.

   (b) Use η to calculate the area of S^2.

4. Exercise 14.28 of Lee on page 368.

5. Exercise 14.34 of Lee on page 372.

6. Problem 14-9 of Lee on Page 376.