

Math 8061, Homework 10

Due Friday 12/8/23

1. Problem 14–6 in Lee.
2. Suppose that ω is a closed form on M , and η is exact. Prove that $\omega \wedge \eta$ is exact.
3. Suppose M and N are connected, oriented smooth n -manifolds, and $f : M \rightarrow N$ is an immersion. Prove that f is orientation-preserving everywhere or orientation-reversing everywhere.
4. Problems on orientations:
 - a) If M is orientable, prove that an open set $U \subset M$ is orientable.
 - b) If M and N are orientable, prove that $M \times N$ is orientable. (Compare Exercise 15.8)
 - c) If M is not orientable, prove that $M \times N$ is not orientable for any N . *Hint:* Use part (a) and induction on dimension.