Math 550 – Homework 1

For discussion: Week 2.

Reminder: Aim to solve at least 3 of the following problems. If you can regularly attend discussion session, please do so and volunteer to present the problems you have solved. If you have a recurring conflict with discussion sessions, please let me know and we will make an arrangement.

(Re)acquaint yourself with the material from Chapters 14, 15, 16 as needed. You do not need to be familiar with the subsections 'An invariant formula for the exterior derivative' and 'Lie derivatives of differential forms' in Chapter 14, and all material about Riemannian manifolds in Chapters 15 and 16.

The following problems from Lee's book: 14-6, 15-3, 16-9, 17-1, 17-4.

Problem 6: Compute $H^1(S^1)$ directly (using calculus but not using Mayer-Vietoris, Poincaré duality, etc.). More precisely, show that the integration map $[\omega] \mapsto \int_{S^1} \omega$ is an isomorphism $H^1(S^1) \to \mathbb{R}$.