Math 550 – David Dumas – Spring 2019

Problem Set 2

Due Monday, February 11 in class

Exercises: Work these out, but do not submit them.

(E–) From the textbook: 21.1, 21.2, 21.3

(E1) Can a free, proper action of a Lie group G on a manifold M have finitely many orbits? (If so, what conditions on G and M are necessary for this?)

Problems: Complete and submit two of these.

(–) Lee, problem 21.5

(P1) Suppose a Lie group G acts smoothly and properly on a manifold M, and that all isotropy subgroups of the action are the same, i.e. $G_p = H$ for all $p \in M$. Show that M/G has a unique smooth manifold structure of dimension $\dim(M) - \dim(G) + \dim(H)$ such that the quotient map $\pi : M \to M/G$ is a submersion.