

UH - Math 7350 - Dr. Heier - Spring 2016

HW 2

Due Wednesday, 03/09, at the beginning of class.

Use regular sheets of paper, stapled together.

Don't forget to write your name on page 1.

1. (2 points) Let  $M, N$  be smooth manifolds with  $M$  connected. Let  $F : M \rightarrow N$  be a smooth map such that  $F_* : T_p M \rightarrow T_{F(p)} N$  is the zero map for each  $p \in M$ . Prove that  $F$  is a constant map. Furthermore, show that this statement is false when the connectedness assumption for  $M$  is dropped.
2. (2 points) Problem 3-4 (page 79)
3. (2 points) Problem 4-2 (page 100)
4. (2 points) Problem 4-11 (b) and (c) (page 101)
5. (2 points) Prove that up to isomorphism, there exist two 2-dimensional Lie algebras.