Homework Assignment 2

December 6, 2013

1. Suppose $f : M \to N$ is a diffeomorphism. Prove that $df_p$ is an isomorphism of the tangent space for all $p \in M$.

2. Let $U \subset M$ be open. Show that $T_pU = T_pM$ for all $p \in U$.

3. Prove that the tangent bundle of a product of manifolds is diffeomorphic to the product of the tangent bundles. Show that for the 2-torus $T^2 = S^1 \times S^1$ we have $T(T^2) = S^1 \times S^1 \times \mathbb{R}^2$. 