

HINTS: PROBLEM SET 2

- §1.3, #1.
 - Note that the Inverse Function Theorem is not enough to show the mapping is a diffeomorphism. Why not?
- §1.3, # 2
 - Use §1.2, # 1.
 - Is the inclusion of Z an immersion?
- §1.3, # 8
 - Showing the map is a one-to-one immersion is straightforward.
 - To show that the map is proper requires some thought. Let our map be represented by $f(t) = (\cosh t, \sinh t)$. Is either $\cosh t$ or $\sinh t$ one-to-one as a map from \mathbb{R} to \mathbb{R} ? Use this to construct a map $G: \mathbb{R}^2 \rightarrow \mathbb{R}$ so that $f(G(t)) = t$. (So G is an extension of f^{-1} to \mathbb{R}^2 .)
 - Recall that compact subsets of \mathbb{R}^n are simply closed and bounded subsets. It suffices to check that $f^{-1}(B)$ is bounded for B a bounded set. Why is the corresponding condition for closed sets automatic? To check the boundedness, it should help to use the map G discussed above.
 - To show the image is one nappe of the hyperboloid, you must check that $\forall t, f(t)$ is in the nappe, and also that f is onto.