Week 1 Exercises

- Lee, Chapter 2, problem 19.
- Lee, Chapter 2, problem 21.

For both 19 and 21, you should sketch the integral curves of X and find the maximal domain of definition of the flow, $\mathcal{D}_X$.

- Lee, Chapter 2, problem 22.
- Lee, Chapter 2, problem 25. Hint: If $g(t)$ and $h(t)$ are curves in $GL(n, \mathbb{R})$, what is $\frac{d}{dt}(g(t)h(t))$? What is $\frac{d}{dt}(g^{-1}(t))$?

1. (The Homogeneity Lemma) For a connected smooth manifold M, let $p \neq q$ be any two points in M. Show that there is a diffeomorphism $\Phi : M \to M$ with $\Phi(p) = q$.