1. (*) Read a good source on the Inverse and Implicit Function Theorems. Perhaps the BS notes, Rudin (Chapter 9), Edwards (Chapter 2), or Lang (Chapter 15).

2. Let \( V \) be a real vector space. A norm on \( V \) is a map \( || \cdot || : V \rightarrow \mathbb{R} \) satisfying:
   
   (a) \( ||x|| \geq 0, \forall x \in V \) and \( ||x|| = 0 \) iff \( x = 0 \)
   
   (b) \( ||cx|| = |c|||x||, \forall c \in \mathbb{R}, \forall x \in V \)
   
   (c) \( ||x + y|| \leq ||x|| + ||y||, \forall x, y \in V \)
   
   Two norms \( || \cdot ||_1 \) and \( || \cdot ||_2 \) on \( V \) are said to be equivalent if there exist real scalars \( \alpha_1, \alpha_2 > 0 \) such that \( \alpha_1||x||_1 \leq ||x||_2 \leq \alpha_2||x||_1 \) for all \( x \in V \).
   
   (a) Show that any two norms on \( \mathbb{R}^n \) are equivalent.
   
   (b) Show that there exist inequivalent norms on \( \mathbb{R}^N = \{(x_1, x_2, \ldots) \mid x_i \in \mathbb{R}, \forall i \in \mathbb{N}\} \).

3. Read Section 1.5 in the BS notes on Taylor’s Theorem, and do Exercises (*) 1.5.4, 1.5.5, (*) 1.5.6, (*) 1.5.7, 1.5.10(i), and 1.5.11, and prove Taylor’s Theorem 1.5.8.

4. Read Section 1.6 in the BS notes on Tangent Hyperplanes, and do Exercises (*) 1.6.2, 1.6.6, (*) 1.6.7, 1.6.8, and 1.6.9.

5. Read Section 1.7 in the BS notes on Max/Min Problems, and do Exercises (*) 1.7.5, 1.7.6, 1.7.7, and 1.7.8.

6. Read Section 1.8 in the BS notes on Lagrange Multipliers, and do Exercises (*) 1.8.5, 1.8.6, 1.8.7, 1.8.13, and (*) 1.8.14.