1. (a) Let $A_i$ be a sequence of matrices in $U(n) = U_n(\mathbb{C})$ converging to a matrix $A \in \mathrm{GL}(n, \mathbb{C})$. Prove that $A \in U_n(\mathbb{C})$ (and thereby establish that $U_n(\mathbb{C})$ is indeed a matrix Lie group).

   (b) Prove the same for $SU_n(\mathbb{C})$.

2. Read the definition of the Euclidean group $E(n)$ in Section 1.2.5 of the book, and verify that $E(n)$ is a matrix Lie group by checking (1.11).

3. Characterize the image of the 'restriction of scalars' map $M_n(\mathbb{H}) \to M_{2n}(\mathbb{C})$ in as nice of a way as you can.

4. From Hall's book: Chapter 1, Problems 2, 3, 5, 8 (see (1.13) for the relevant definition), 11.