Exercise 1. Textbook exercise I.1(a)-(e).

Exercise 2. Textbook exercise I.1.3.

Exercise 3. Textbook exercise I.1.5.

Exercise 4. Textbook exercise I.1.6.

Exercise 5. Show that every real matrix of the form $\left(\begin{smallmatrix} x & -y \\ y & x \end{smallmatrix}\right)$ can be factored uniquely in the form $\left(\begin{smallmatrix} r & \\ & r \end{smallmatrix}\right)\left(\begin{smallmatrix} u & -v \\ v & u \end{smallmatrix}\right)$, where $r \in \mathbb{R}_0^+$, and $u, v \in \mathbb{R}$ satisfy $u^2 + v^2 = 1$. Use this to derive the polar representation of complex numbers. [*Suggestion:* Take $r = \sqrt{x^2 + y^2}$.]