Chapters 1 and 2:

(1) Write the following system of linear equations as an equation for a single function $f : \mathbb{R}^n \to \mathbb{R}^m$ for appropriate choices of $m, n \in \mathbb{Z}_+$,

\[
\begin{align*}
    x + 2y - 3z &= 4 \\
    x + 3y + z &= 11 \\
    2x + 5y - 4z &= 0 \\
    x + y + z &= 22
\end{align*}
\]

(2) Solve the equation $z^3 - 4i = 0$ where $z \in \mathbb{C}$.

(3) Find $r > 0$ and $\theta \in [0, 2\pi)$ such that $(1 - i)/\sqrt{2} = re^{i\theta}$.

(4) Let $z, w \in \mathbb{C}$. Prove the parallelogram law

\[
|z - w|^2 + |z + w|^2 = 2(|z|^2 + |w|^2).
\]

(5) Let $z, w \in \mathbb{C}$ with $\bar{z}w \neq 1$ such that either $|z| = 1$ or $|w| = 1$. Prove that

\[
\left| \frac{z - w}{1 - \bar{z}w} \right| = 1
\]