2.5 Prove that, for $\alpha \in \mathbb{D}$,
\[
\{ f \in RH^2 : f(\alpha) = 0 \}
\]
is a closed linear subspace of $RH^2$ (use Problem 1.11).

2.13 Prove that every finite-dimensional subspace of a normed space is closed.

3.3 Prove that $\ell^\infty$, the space of bounded sequences of complex numbers with the supremum norm is complete.

($\ell^\infty$ denotes the complex vector space of all bounded sequences $x = (x_n)_1^\infty$ of complex numbers, with componentwise addition and scalar multiplication, and $\|x\|_\infty = \sup_{n \in \mathbb{N}} |x_n|$.)

3.9 Let $E$ be the Banach space $\mathbb{R}^2$ with norm
\[
\|(x_1, x_2)\| = \max\{|x_1|, |x_2|\}.
\]
Show that $E$ does not have the closest point property by finding infinitely many points in the closed convex set
\[
A = \{(x_1, x_2) : x_1 \geq 1\}
\]
which are at minimal distance from the origin.