1. (10 points) Problem 6.5
2. (10 points) Problem 6.6
3. (10 points) Problem 6.7
4. (20 points) Problem 6.9
5. (30 points) Let $X$ be a complex normed vector space and $f : X \to \mathbb{C}$ be a linear map.

(a) Show that if $f$ is unbounded, then there exists a sequence $\{x_n\}_{n=1}^{\infty}$ such that $\|x_n\| \to 0$ as $n \to \infty$ and $f(x_n) = 1$.

(b) Show that $f$ is continuous if and only if $\ker(f) := \{x \in X : f(x) = 0\}$ is closed. (Hint: Use part (a) and the linearity of $f$.)