Loyola University Chicago **HW 2**
Math 475, Fall 2014

Read ASAP: MacCluer Chapter 1 (think $\mathbb{R}$ when you see $\mathbb{C}$, and skip, if you wish, examples that talk about analytic functions). Recommended read: Bachman and Narici, Chapters 1, 2, 3.

Book Problems. (MacCluer) 1.2, 1.3; 1.5; 1.10 a,b;

Problem 1. Show that the space l^∞ of all sequences $x = \{x_i\}_{i=1}^\infty$ such that $\sup\limits_{i\in\mathbb{N}} |x_i| < \infty$ with the norm $\|x\|_\infty = \sup\limits_{i\in\mathbb{N}} |x_i|$ is a Banach space.

Problem 2. Consider a real Banach space X with norm $\|\cdot\|$.

(a) Show that the map $x \mapsto \|x\|$ from X to $\mathbb{R}$ is continuous. Is it uniformly continuous?

(b) Show that the maps $(x, y) \mapsto x + y$ from $X \times X$ to X and $(c, x) \mapsto cx$ from $\mathbb{R} \times X$ to X are continuous. *(On $X \times X$, take the norm $\|(x, y)\| = \|x\| + \|y\|$. On $\mathbb{R} \times X$, take the norm $\|(c, x)\| = |c| + \|x\|$.)*