Due in Class: February 5, 2015.

Reading: Read Chapter 5, Sect. 5.5.

Turn in the following exercises. Exercise a.b refers to Exercise b in Chapter a in the Textbook.

**Problem 1.** Exercise 5.2. You can take for granted that $\mathcal{L}(\mathcal{X}, \mathcal{Y})$ is a vector space.

**Problem 2.** Exercise 5.4.

**Problem 3.** Exercise 5.7.

**Problem 4.** Exercise 5.25.

**Problem 5.** Exercise 5.27. Note: The term *meager* means that the set is a countable union of nowhere dense sets.

**Problem 6.** Exercise 5.32.

**Problem 7.** Exercise 5.38.

**Problem 8.** Show that if $(\alpha_j)$ is a sequence of complex numbers such that $\sum_j \alpha_j \xi_j$ converges for every sequence $(\xi_j)$ of complex numbers with $\xi_j \to 0$ as $j \to \infty$, then $\sum_j |\alpha_j| < \infty$.

**Problem 9.** Does there exist a sequence of continuous positive functions $f_n$ on $\mathbb{R}$ such that the sequence $(f_n(x))$ is unbounded if and only if $x$ is rational? *Hint:* Is $\mathbb{Q}$ a $G_\delta$?