Homework 11
Real Analysis
Math 212a – Harvard University – Fall 1998
Due Friday, 4 December 1998

Royden: Chapter 10 (8, 13, 17, 18, 22, 23).

1. Let X be an infinite-dimensional Banach space. Show there is an un-
   bounded linear functional $\phi : X \to \mathbb{R}$. That is, construct a linear map ϕ
   such that $\sup_{x \neq 0} |\phi(x)|/\|x\| = \infty$. (Hint: choose a basis for X using the
   Axiom of Choice.)