Math 525

Homework due 02/12/03

Reading: Sections 1, 2, 3 and 4, Chapter 9 from Royden. Sections 2, 4, 5 and 6 Chapter 4 from Folland.

Problems from Folland:

Chapter 4, Section 1: problems 3, 4, 6 and 10.

Chapter 4, Section 2: problems 14, 16.

$(*)$ **Problem** Consider the vector space $C\big((0,1)\big)$ of continuous real-valued functions on the interval $(0,1)$, and for $x \in (0,1)$ define the evaluation map $P_x : C\big((0,1)\big) \to \mathbf{R}$ by $P_x f = f(x)$. We give $C\big((0,1)\big)$ the weakest topology $\mathcal{T}$ for which P_x is a continuous map for each point $x \in (0,1)$. Show that the topology $\mathcal{T}$ is not metrizable; that is, there is no metric on $C\big((0,1)\big)$ that induces the topology $\mathcal{T}$.