01325 Mathematics 4, Spring 2013

Week no. 8

Theory: In the week April 1–5 the lectures cover

Sections 2.3, 3.3, and Section 6.3

The theme of the lecture is Approximation Theory. Besides the new material stated above, we return to parts of the book that have already been on the reading list (for example, Section 2.2, Lemma 3.2.4, Theorem 5.4.2, and page 79-81).

Question Session: Due to the holiday, the question session this week will take place Tuesday April 2, as usual 12:05-12:55. The location is Building 303, Room 143 (same building as usual, but on the first floor).

Exercises for the week April 1–5: 3.5, 3.6 ($\mathbf{v}_k = \delta_k$), 5.10, Problem 220, Problem 223, 2.6, 2.7

I am confident that this program is enough, but if you want more, you can look at Problem E below.

Problem E

(i) Give at least two arguments that the differential operator $P : L^1(\mathbb{R}) \to L^1(\mathbb{R}), Pf := f'$ is not well defined.

(ii) Let

$$V := \{f \in L^1(\mathbb{R}) \;\big|\; f \text{ is differentiable, } f' \in L^1(\mathbb{R}) \cap C_0(\mathbb{R})\},$$

and argue that

$$P : V \to L^1(\mathbb{R}), Pf := f'$$

is well defined and linear.

(iii) Show that the operator P defined in (ii) is unbounded.

Homework 8, to be turned in no later than April 10: 3.10(i), 3.8, Problem 213

Regards,
Ole