Math 25b: Honors Linear Algebra and Real Analysis II

Homework Assignment #$10\frac{1}{2}$ (21 April 2014):
Integrable functions

> Bitte ve[r]giß alles, was Du auf der Schule gelernt hast;
> denn Du hast is nicht gelernt. *Emil Landau*[1]

Admittedly that's a bit extreme here — "contented sets" and "admissible functions" are a different flavor of calculus than what you've probably seen *auf der Schule*, but they do naturally connect back to familiar territory of Riemann sums etc. before long. The present problem set (abridged because it covers only $1\frac{1}{2}$ class meetings, not the usual three) should help develop a sense of how this approach to integration works.

1. **[Sadik]**Solve Exercise 2.1 on page 223 of the Edwards text (this shows as promised that for each n the admissible functions on $\mathbf{R}^n$ form a real vector space).

2. **[Nat]**Prove that if f is an admissible function on $\mathbf{R}^n$ then so is the function $|f|$ taking any $x \in \mathbf{R}^n$ to $|f(x)|$. Deduce Exercise 2.2 on page 223, and more generally that if f, g are admissible then so are $\max(f, g)$ and $\min(f, g)$.

3. **[Nat]** Solve Exercise 2.3 on page 223 (in which A is an arbitrary subset of $\mathbf{R}^n$).

4–5. **[Tudor]** Solve Exercise 2.6 on page 223, and Exercise 3.3 on page 233. (For the latter, it may help to look first at Exercise 3.4, which I'm not assigning because we'll at least outline in class the proof that the text's Hint suggests.)

This problem set is due Friday, April 25, at 5PM.

[1] Quote taken from Chapter 10 of M. Artin's *Algebra*. It roughly translates as "Please forget all that you have learned in school, for you haven't [really] learned it." Don't complain about the German transcription, which is presumably of some local dialect — even I recognize that this isn't the German we *auf der Schule lernen*.