Math 25b Homework 3

Due Wednesday 22nd February 2006.

Half of this problem set will be graded by Alison and half by Ivan. Please turn in problems from Section 1 separately from the problems in Section 2. Remember to staple each bundle of solutions and also to put your name on each!

1 Alison's problems

(1) Problem 2 on page 114 of Rudin

(2) Problem 3 on page 114 of Rudin.

(3) (a) Problem 9 on page 115 of Rudin.
    (b) Problem 11 on page 115 of Rudin.

(4) Problem 4 on page 114 of Rudin.

2 Ivan's problems

(1) Problem 13 parts (a)-(e) on page 115 of Rudin. (Hint: make sure you make use of what you learn in each part.)

(2) Problem 25 on page 118 of Rudin.

(3) Construct a function $f : \mathbb{R} \to \mathbb{R}$ such that

- f is infinitely differentiable (i.e. the nth dertivative $f^{(n)}(x)$ exists for all $n \in \mathbb{N}$ and all $x \in \mathbb{R}$);

- $f(x) = 0$ for all $x \leq 0$;

- f is not the zero function.

Can you find such a function satisfying $f(x) = 1$ for $x \geq 1$?

3 The problems I didn't assign—good practice!

(1) Problem 1 on page 114 of Rudin.
(2) Problem 10 on page 115 of Rudin.
(3) Problem 14 on page 115 of Rudin. (Another convexity problem.)
(4) Problem 22 on page 117 of Rudin. (More fixed point problems.)
(5) Problems 26—29 on page 119 of Rudin. (Problems on ODE's—I might set these later in the course.)