Math 131BH Spring 2018: Homework 3, due in class 4/25

1-4. Rudin p138, Problems 6, 8,11,12.

5. Compute

$$\int_0^1 x d\alpha,$$

where α is the Cantor function constructed in class.

6. Suppose f is continuous and is differentiable for "almost every" x in $[0,1]$ in the following sense. For any $\varepsilon > 0$, there exists a union of disjoint open intervals $A_N = \cup_{n=1}^N I_n$ in $[0,1]$ such that

(a) $\Sigma_{n=1}^N |I_n| \geq 1 - \varepsilon$ and

(b) f is differentiable in A_N.

Let us define $\int_{A_N} f'(x)dx := \Sigma_{n=1}^N \int_{I_n} f'(x)dx$. Is it always true that $f(1) - f(0) =$ "$\int_0^1 f'(x)dx$" $:= \lim_{N\to\infty} \int_{A_N} f'(x)dx$?