Homework due Thursday, February 21:

13. Recalling Exercise 2, is it true that for the lifted middle-thirds Cantor set $\mathbf{K}$, the set of points a where the strict inequality

$$\liminf_{r \downarrow 0} \frac{\mathcal{H}^1(\mathbf{K} \cap \mathbf{B}(a,r))}{2r} \;<\; \limsup_{r \downarrow 0} \frac{\mathcal{H}^1(\mathbf{K} \cap \mathbf{B}(a,r))}{2r}$$

is true has positive $\mathcal{H}^1$ measure? Explain.

14. Suppose $\gamma : [0,1] \to \mathbf{R}^2$ is continuous and not constant. Show that the lower density

$$\liminf_{r \downarrow 0} \frac{\mathcal{H}^1\big[\gamma([0,1]) \cap \mathbf{B}(\gamma(t),r)\big]}{2r}$$

is at least $\frac{1}{2}$ for all $t \in [0,1]$.

15. # 6 on P.518 of Jones. f is differentiable at x if and only if $df(x) = Df(x) < \infty$.