This question was asked about problem 14 in Chapter 3: is there a measurable set of infinite measure with $|E|_i \neq \infty$?

Answer: No.

Proof: Let $|E| = \infty$. For each $k \in \mathbb{Z}^+$ we set $E_k := E \cap B_k(0)$. Then, for k so large that $|E_k| > 1$, by Lemma (3.22) (the characterization of measurability in terms of closed sets), there exists a closed set $F_k \subseteq E_k$ such that $|E_k \setminus F_k| < 1/k$. Thus (for review, why?) $|E_k| - 1/k < |F_k| \leq |E|_i$. It follows that $|E|_i = \infty$.