Math 4001-5001: HW12

Due Wednesday, 12/11/2019

Problem 123.1 Recall the Cantor set is uncountable.

   a. Ask google what the Lebesgue measure of the Cantor set is.

   b. Let C denote the Cantor set, and $s : [0,1] \to \mathbb{R}$ be given by

$$s = 2\chi_{[0,1]-C}$$

     Compute

$$\int_{[0,1]} s \; dm =$$

   c. Ask google what convergence almost everywhere means. Define a sequence $f_n : \mathbb{R} \to \mathbb{R}$

$$f_n = n\chi_{\mathbb{Q}} + \frac{1}{n}\chi_{\mathbb{R}-\mathbb{Q}}. \tag{1}$$

     Complete the sentence: As $n \to \infty$, $f_n \to \underline{\quad}$ almost everywhere.