Let m be the Lebesgue measure as described in class. Let $\mathcal{C}$ be the Cantor set as described in class. Compute $m(\mathcal{C})$.

Proof:

Let $\mathcal{C}$ be the Cantor Set.

Then, with deMorgan's law and Assessment 17 part 3,

$$\begin{aligned}
&\mu(\mathcal{C}) \\
&= \mu(\bigcap_{i}^{\infty} C_i) \\
&= 1 - \mu(\bigcup_{i}^{\infty} C_i^c) \\
&= 1 - \lim_{n\to\infty} \mu(\mathcal{C}_n^c) \\
&= 1 - \lim_{n\to\infty} \sum_{i=0}^{n} \tfrac{1}{3}(\tfrac{2}{3})^i \\
&= 1 - \tfrac{1}{3} \times \tfrac{1}{1-\frac{2}{3}} \\
&= 1 - 1 = 0.
\end{aligned}$$

Since μ is a measurement, $\mu(\mathcal{C}) = 0$. $\square$