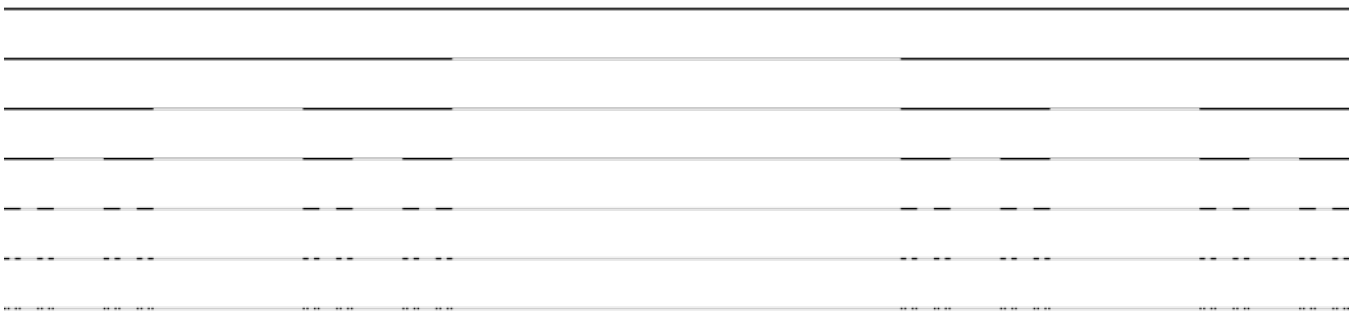
Cantor's Strange Set

The *Cantor Set*, named after the German mathematician Georg Cantor, is constructed as follows:

Start with the closed interval $[0, 1]$ and remove the "open middle third," that is, the open interval $\left(\frac{1}{3}, \frac{2}{3}\right)$. On the number line below, draw the remaining points.

The remaining segment is two closed intervals $\left[0, \frac{1}{3}\right]$ and $\left[\frac{2}{3}, 1\right]$. Repeat the process by removing the open intervals $\left(\frac{1}{9}, \frac{2}{9}\right)$ and $\left(\frac{7}{9}, \frac{8}{9}\right)$. On the number line below, draw the remaining points.

Continue that process of removing the "open middle third" forever. The set that remains after this process is called the Cantor Set.



Note: there are infinitely many points in the Cantor Set. What is the total length of the removed intervals?