

1. PROBLEMS TO BE PRESENTED ON 10-04

If you are interested in doing a problem, but would like some help, email me for hints.

- First problem for presentation: The **Fat Cantor Set** is constructed as follows.
 - Step 1: You start with the interval $[0, 1]$
 - Step 2: Then you remove the middle $1/4$ of this interval, so you have 2 intervals left– $[0, 3/8]$ and $[5/8, 1]$.
 - Step 3: From each of these two intervals you remove their middle $1/16$, so you have 4 new intervals.
 - Step 4: From each of these 4 intervals you remove their middle $1/64$, so you get 8 new intervals.
 - \vdots
 - Step n : From each of these 2^{n-2} intervals, you remove their middle $\frac{1}{2^{2(n-1)}}$, giving you 2^{n-1} intervals.
 - \vdots

Show that the “length” of the fat cantor set is $1/2$. However, also show that the fat cantor set contains no intervals.

- Second Problem for Presentation: Find (and show) the value of

$$1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{\ddots}}}$$

- Third Problem for presentation:
 - Can you find a sequence a_n where $\lim_{n \rightarrow \infty} a_n = 0$, but $\sum_{n=1}^{\infty} a_n$ diverges to infinity?
 - Can you find a sequence b_n where $\lim_{n \rightarrow \infty} b_n = 0$, but $\sum_{n=1}^{\infty} b_n$ does not converge, but does not diverge to $\pm\infty$?