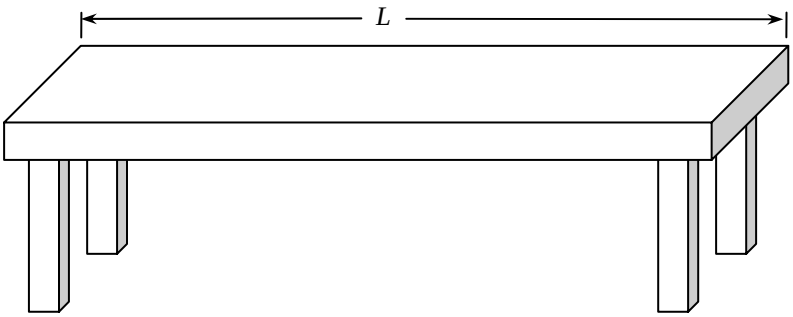
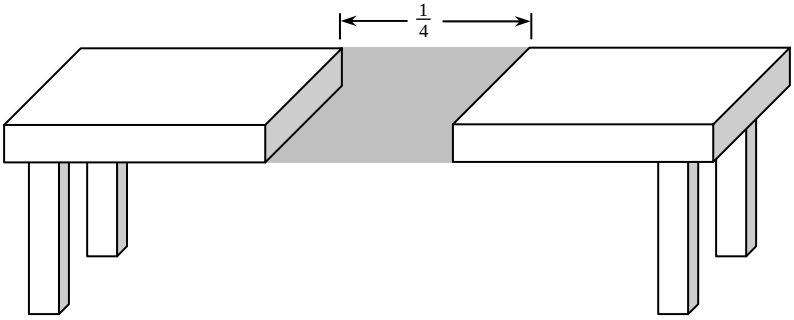
Cantor's Disappearing Table

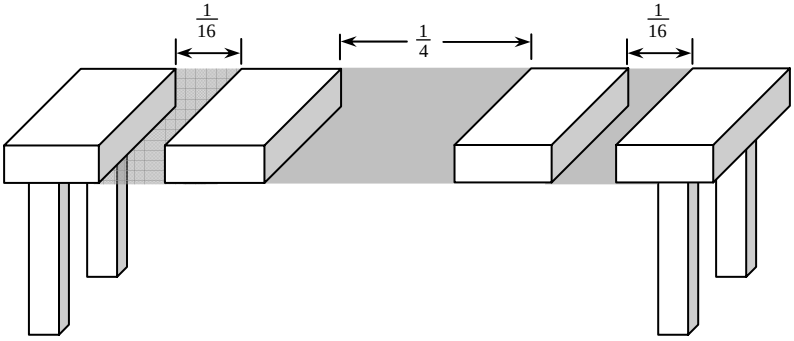
Problem: Start with a table length L.



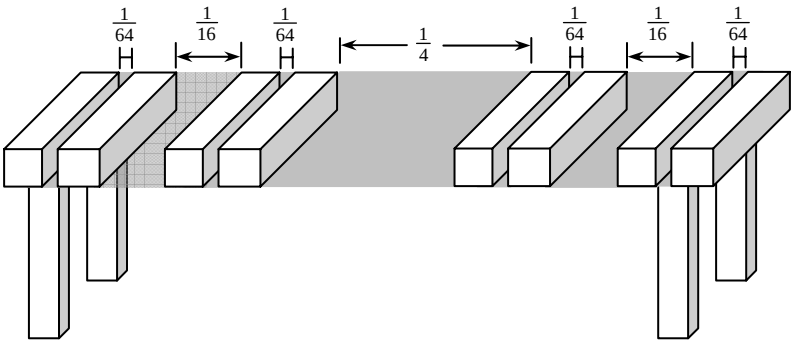
Remove $\frac{1}{4}$ of the table centered at the midpoint. The remaining pieces each have length less than $\frac{1}{2}L$.



Remove $\frac{1}{8}$ of the table by taking two sections of length $\frac{1}{16}L$ from the centers of the remaining pieces. The remaining pieces each have length less than $\frac{1}{4}L$.



Remove $\frac{1}{16}$ of the table by taking four sections of length $\frac{1}{64}L$ from the centers of the remaining pieces. The remaining pieces each have length less than $\frac{1}{8}L$.



Continuing this process indefinitely yields the following results:

Amount of table removed: $\frac{1}{4}L + \frac{1}{8}L + \frac{1}{16}L + \frac{1}{32}L + \cdots = \sum_{n=2}^{\infty} \frac{1}{2^n} L = \frac{1}{2}L$

Remaining lengths less than: $\frac{1}{2}L, \frac{1}{4}L, \frac{1}{8}L, \frac{1}{16}L, \ldots$, so the remaining lengths are each tending toward zero.

Question: Will continuing this process cause the table to disappear, even though you have only removed half of the table? Why or why not?

Discuss your conclusions on a separate sheet of paper. This **extra credit** assignment is worth a maximum of 5 points and will be due on Monday, April 9, 2007. To receive full credit you must *analytically* justify your answer. Any conclusions you come to must be justified using techniques learned in this course.