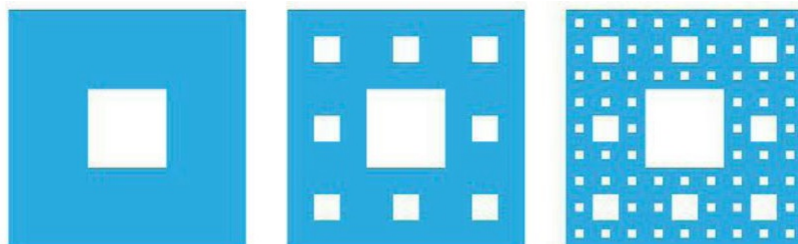


MATH 1953 Written Homework 5 (due Wednesday, May 8th at the BEGINNING of class!)

Please write solutions to these problems on separate sheet(s) of paper (i.e. don't print and write on this assignment.)

1. Use the Squeeze Theorem to show that $\frac{2^n}{n!} = 0$. (HINT: remember that $n! = n \cdot (n - 1) \cdot (n - 2) \cdots 2 \cdots 1$ and write 2^n as a product of 2 with itself n times.)
2. The Sierpinski Carpet shown below is constructed by an infinite process. We begin with a square of side length 1. In step 1, we subdivide into 9 equal squares and remove the middle one. In step 2, we subdivide all 8 remaining squares into 9 smaller ones and remove the center square, and then we continue this process forever.



In Step 1, we removed a single square with side length $\frac{1}{3}$, so we removed an area of $\frac{1}{9}$. Figure out how much area is removed in Step 2 and in Step 3, and then use this to make a guess about the area removed in Step n for any n . Then, use this to express the area of the Sierpinski Carpet as an infinite series, and find its exact value.