**Math 1001 Quiz 7** Name: Section: 10:10 11:15 12:20

1. (8 points, 2 points each) True or false.

   T F The Koch snowflake encloses an infinitely large area.

   T F The Koch snowflake has an infinitely long bondary.

   T F After each step in constructing the Sierpinski gasket, there are three times as many triangles as there were before.

   T F When playing the "chaos game," at each stage you roll a die and move *halfway* from your current position to whatever corner corresponds to the die roll.

   The next two questions both refer to this construction, called the Cantor set.

   Suppose we start with a line. At step 1, we cut out the middle $\frac{1}{3}$ of the line, leaving two smaller lines. We keep repeating this: at each step, we cut out the middle $\frac{1}{3}$ of all the remaining lines. Here is a picture of the first few steps:

2. (3 points) Find a general formula for the number of lines left after step $n$.

3. (3 points) If the line starts with length 1, find a general formula for the length left after step $n$.

4. (3 points) Multiply these two complex numbers.

$$(1 + 2i) \times (5 + 2i) =$$

5. (3 points) What does the infinite sum

$$1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \frac{1}{81} + \cdots$$

   add up to?