## Problem Set 3

Due: March 13

Reading: Notes for Week4

**Problem 1.** Fractals are yet another example of a mathematical object that can be defined recursively. In this problem, we consider the Koch snowflake. Any Koch snowflake can be constructed by the following recursive definition.

- Base Case: An equilateral triangle is a Koch snowflake.
- Recursive case: Let *K* be a Koch snowflake, and let *l* be a line segment on the snowflake. Remove the middle third of *l*, and replace it with two line segments of the same length as is done below:

The resulting figure is also Koch snowflake.

Prove by structural induction that the area inside any Koch snowflake is always a multiple of  $\sqrt{3}$ .

**Problem 2.** State machines and invariants

Problem 3.

Problem 4.

Problem 5.

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Problem 6.

Problem 7.

## **Student's Solutions to Problem Set 3**

Your name:

Due date: March 13

Submission date:

Circle your TA: Christos Grant Sonya

**Collaboration statement:** Circle one of the two choices and provide all pertinent info.

- 1. I worked alone and only with course materials.
- 2. I collaborated on this assignment with:

got help from:<sup>1</sup>

and referred to:<sup>2</sup>

## DO NOT WRITE BELOW THIS LINE

Problem	Score
1	
2	
3	
4	
5	
6	
7	
Total	

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<sup>&</sup>lt;sup>1</sup>People other than course staff.

<sup>&</sup>lt;sup>2</sup>Give citations to texts and material other than the Spring '06 course materials.