

## Lab Exercise 10

Software Design  
Spring 2007

Allen B. Downey

Due: never!!!

### 10.1 Threaders

1. Download and read

```
wget http://wb/sd/code/Threader.py
```

Now run it. When you press the **Make Threader** button, it creates a **Threader** (which is a kind of **Turtle**). The **Threader** executes **snowflake**, which runs for a while, drawing a Koch snowflake.

2. While the **Threader** is making the rounds, try pressing **Run this code**. Is the GUI responsive while **snowflake** is running? What does this tell you about the way the GUI is implemented in Tkinter?
3. While the **Threader** is hard at work, press the **Quit** button. Does the program quit right away? Why not? Try hitting **Control-C** while it is running.
4. While one **Threader** is hard at work, press the **Make Threader** button and see what happens. Can you explain what you see?
5. Change **make\_threader** so that when it invokes **snowflake**, it runs in a new **Thread**. Now run more than one **Threader** at a time. See the difference? Do all the **Threaders** run at the same speed? Why or why not?
6. Unfortunately, you still can't quit while a **Threader** is running. To fix that:
  - (a) Add an attribute named **running** to **Threader**, and initialize it to 1.
  - (b) Change **koch** so that it checks **running** and quits if it is 0.
  - (c) Create a new kind of **TurtleWorld** called **ThreaderWorld**. Override **quit** so that when the user presses quit, it loops through all the **Threaders** and sets their **running** attribute to 0.

It ain't pretty, but unfortunately you can't really kill another thread; you have to ask it to kill itself.

7. Create a *lot* of **Threaders**. What happens? Why?