**Department of Mathematics**
# Maths 190 and Maths 190G
## Lecture 4 Summary

In this lecture we illustrate two important observations:
- Certain patterns, and sequences of number reappear throughout nature. One common one is the Fibonacci sequence.
- Rabbits breeding, the numbers of spirals on pinecones and daisies, all follow the Fibonacci sequence.

Lecture 4 was based around the following question:

**Question: What do rabbits, pinecones and daisies all have in common?**

We started counting spirals on pinecones, pineapples, daisies, and sunflowers. The list of numbers so obtained, in ascending order, was 5, 8, 13, 21, 34, 55, 89; any given object inspected had two sets of spirals whose counts were two consecutive numbers in this sequence. We identified the sequence as part of the infinite Fibonacci sequence and predicted the next number, 144. The Taramahara White sunflower, from the lecturer's garden, was found to have two sets of spirals numbering 89 and 144.

By playing a game called Busy Bunnies (see p. 58 of text), we then saw how rabbits, breeding according to a simple population model, grow like the numbers in the Fibonacci sequence. (The number of rabbits in one year is obtained by adding the number of rabbits in the previous two years.)

Finally, we computed the relative sizes of successive Fibonacci numbers and showed how, as the Fibonacci numbers get larger, it gets closer and closer to something called the Golden Ratio, which you'll see again later in the course.

**Before you come to the next lecture:** You should spend an hour or two thinking and reading about the ideas presented in the lecture. You should also:
- Read 2.3.

**Other activities you could do if you have time are:**
- Find some Fibonacci numbers in nature for yourself. Bring some to the next class if you can.
- Is the Fibonacci sequence a good model for the growth of a rabbit population? Think of some reasons for and against.