CAIS 117: Intro to Programming with Python

Spring 2024

In-class Activity 04: Recursion

*Activity is DUE as indicated on the course schedule. This is a **group assignment**; work with 1-2 classmates.*

Goals:

- Write recursive functions

Part 1

1. A **factorial** (!) of a number (n) is defined as:

$$n! = n * (n-1) * (n-2) * \ldots * 1,$$
$$0! = 1$$

Write a function that uses recursion to compute the factorial of a number. The function should expect an integer as input and return an integer.

2. The **Fibonacci Sequence** is a sequence of numbers starting with 0 and 1, where each number in the sequence is equal to the sum of the two previous numbers.

Ex. 0, 1, 1, 2, 3, 5, 8, 13, 21, 32, …

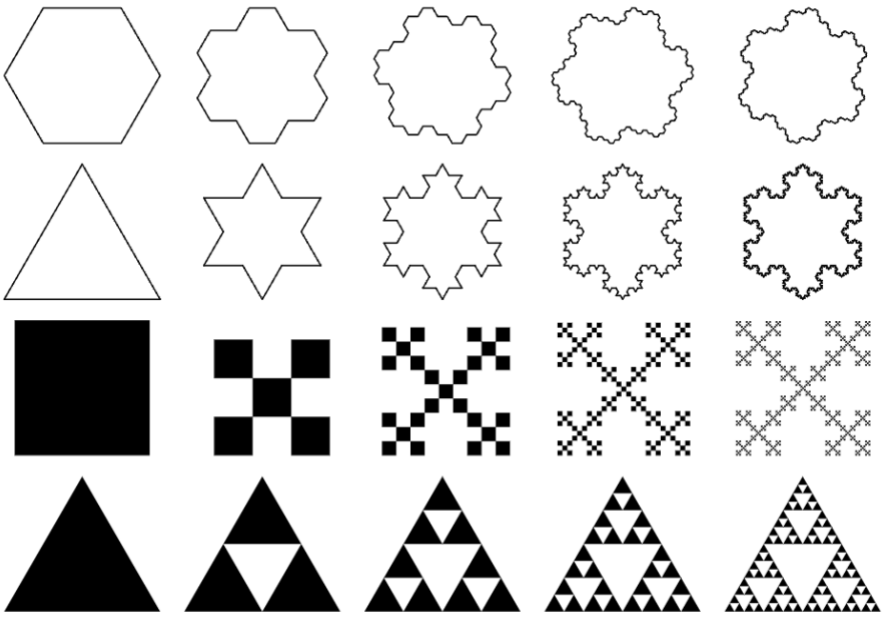
If each number in the sequence is denoted F_i, where i is the current step in the sequence, then

$$F_i = F_{i-1} + F_{i-2},$$
$$F_0 = 1, F_1 = 1$$

Write a function that uses recursion to print the Fibonacci sequence up to a certain step. The function should expect an integer (denoting the number of steps) as input and should return nothing. It should print however many steps are input of the Fibonacci sequence.

Ex. Calling the function with 5 should print 0, 1, 1, 2, 3.

3. A **fractal** is an image that is self-similar on all scales.
   Ex.



   Write a recursive function that generates a fractal. You can choose whatever fractal you'd like. You should use ascii characters to make the shape you want.

Submission

Save your code in a GitHub repository. Copy the link to the repository into a PDF and submit your PDF as a group on Gradescope.