Problem I.6

Fibonacci Sequence 2

Due Date: 2/15/2019
Folder: `IntroToProgramming`
File Name: `FibSeq2_LastName.py`

Learning Objectives

- Programming Skills
  - ⋆ For loops
  - ⋆ Conditionals
  - ⋆ Mod function
- Conjecture a pattern from data

Problem Background

Recall the Fibonacci sequence $F_0 = 0, F_1 = 1$,

$$F_n = F_{n-1} + F_{n-2}.$$

We will be considering this sequence and looking at which terms are divisible by certain integers. For instance, how many terms are even, how many are multiples of 3, and so on.

Programming Reminders

- Syntax for a `for` loop: `for ii in range(N):`

- To create an empty list use `my_list = []`

- To check if `n` is a multiple of `m`, use `if(n % m == 0)`

Program Criteria

Write a program that does the following:

- Create an input variable `N` for the number of terms to generate in your sequence.

- Create an input variable `m` to hold the multiple you will be checking.

- Generate the first N terms of the Fibonacci sequence, using the typical initial terms, described above and store them in a list.

- In a different list, store all terms of the Fibonacci sequence that are multiple of `m`.

- Print out the number of terms that are divisible by `m`.

Deliverables

An interesting question to ask is which elements of the Fibonacci sequence are even? Which are multiples of 3? Multiples of 4? Prime? These are questions that can be at least conjectured at with the code in the Problem.

Place the following in a folder named `IntroToProgramming` in your repository:

- A Python file `FibSeq2_LastName.py` that satisfies the program criteria.

- A Latex document `FibSeq2_LastName.pdf` with the following information:

  - ⋆ List all multiple of 4 in the first 50 Fibonacci numbers.
  - ⋆ What percentage of the first 10,000 Fibonacci numbers are even?
  - ⋆ Can you conjecture a pattern for the percentage of Fibonacci numbers that are multiples of m. (For instance, one conjecture would be that the percentage of Fibonacci numbers that are multiple of m is $\frac{3}{m^2}$.)