

# Generalized Fibonacci Project

Math 242, spring 2022

## Due: Monday, March 14

(Following the due date and initial grading, there will be an opportunity to revise and resubmit for a higher grade.)

In this project, you will explore your own generalized Fibonacci (or “gibbonacci”) sequence. Choose your own integers  $a$ ,  $b$ ,  $r$ , and  $s$ , and define your sequence:

$$G_0 = a$$

$$G_1 = b$$

$$G_n = rG_{n-1} + sG_{n-2} \text{ for } n > 1.$$

Make sure your sequence is not the same as the Fibonacci, Lucas, or Pell sequences.

Search for identities involving your sequence, using Chapter 2 of our text as your guide. As part of your exploration, try to find a polynomial identity. *State at least four conjectures*, supported by computational evidence.

For projects in Math 242, *communication* is as important as *computation*. You should turn in a well-organized notebook that clearly explains, using sentences and paragraphs, what you computed and what conclusions you can draw.

This project will be graded on the EMRN scale, as described in the syllabus. To receive a grade of *Meets Expectations*, your notebook should exhibit the following characteristics:

- You demonstrate computational exploration of your generalized Fibonacci sequence.
- You state four conjectures involving your sequence, supported by computational evidence.
- Your reasoning is explained using sentences, and your notebook is well-formatted and easy to read.
- No significant gaps or errors are present.

To receive a grade of *Excellent*, your notebook should further exhibit the following:

- Computational methodology demonstrates mastery of the computational techniques that we have studied in this course.
- Mathematica code is of high quality, demonstrating skillful use of programming constructs (e.g., variables, lists, functions, modules).
- Exposition is clear and precise, thoroughly explaining your methodology and reasoning. Any assumptions necessary for the estimates are reasonable and clearly stated.
- The work may extend beyond the project requirements in a creative or insightful direction.