Handout 4

Math 2130 — Fall 2022

9 November, 2022

1. The Fibonacci numbers begin with $F_0 = 0$, $F_1 = 1$, and $F_n = F_{n-1} + F_{n-2}$ thereafter. Write out the first 10 Fibonacci numbers.

2. Find a 2×2 matrix A such that $A \begin{pmatrix} F_{n-2} \\ F_{n-1} \end{pmatrix} = \begin{pmatrix} F_{n-1} \\ F_n \end{pmatrix}$ for every integer $n \geq 2$.

3. Compute the eigenvectors and eigenvalues of A. (Note: these numbers will not be simple but they may be familiar.)

4. Compute $A^{100} \begin{pmatrix} 0 \\ 1 \end{pmatrix}$. Suggestion: use ϕ and $\bar{\phi}$ to represent the two eigenvalues, instead of writing them out.

5. What is the 100th Fibonacci number?

6. Write a formula for the n-th Fibonacci number.