MAT 331 Fall 2023, Homework 1
The Fibonacci sequence

(1) Compute the golden ratio, $\phi = (1 + \sqrt{5})/2$ to 15 significant digits.

(2) The Fibonacci sequence is a sequence of integers defined recursively in the following way. Let $F_1 = 1$, and $F_2 = 2$. Then, we define $F_{n+1} = F_n + F_{n-1}$ for all $n \geq 3$. Give the first 20 numbers in this sequence.

(3) Plot F_{n+1}/F_n for n between 1 and 20. What does this seem to converge to? Make sure you include a title and labels on your plot.

(4) How often do the Fibonacci numbers take a particular value in their last digit? Draw a histogram of the first 1000 last digits. You can use the command `mod(F,10)`, where F is a Fibonacci number to find this last digit. That is, this command returns the remainder of F after division by 10. Do the same after division by 5. Which digits are used the most? Which are used the least? Do the digits seem mostly uniformly distributed? Describe the differences between the two histograms.