

Homework Assignment 6

Use **Matlab** to solve the following problems.

1. The **Fibonacci Sequence** is $(a_n) = \{1, 1, 2, 3, 5, 8, 13, 21, \dots\}$. A new sequence $(b_n) = (a_{n+1}/a_n)$ is formed through dividing every term by its previous term. (This new sequence will approach the **Golden Ratio** $\gamma = \frac{1+\sqrt{5}}{2}$.) Determining the number of terms in (b_n) one has to compute in order to guarantee that the computed approximation is of less than 10^{-10} of error. (i.e. How large n has to be to ensure that $|b_n - \gamma| < 10^{-10}$?).
2. Define a sequence $\{x_n\}$ by $x_{n+1} = f(x_n)$ with

$$f(x_n) = \begin{cases} 0.8 * x_n & \text{if } 0 \leq x_n \leq 0.5 \\ 0.8 * (1 - x_n) & \text{if } 0.5 < x_n \leq 1 \end{cases}$$

Take $x_1 = 0.9$, and create the sequence of $\{x_n\}_{n=1}^{50}$, and observe what x_{50} is. Create another sequence by the same definition starting with $x_1 = 0.3$ and observe what x_{50} is. Comment on your observation for both cases.

(80% for correctness, 10% for programming writing, 10% for presentation)