

Problem 3. A sequence $\{x_n\}_{n \geq 0}$ is given by the recursive relation

$$x_n = \frac{1 + x_{n-1}}{x_{n-2}}, \quad n = 2, 3, \dots$$

with positive initial values $x_j > 0$, $j = 0, 1$.

- (i) Find the set of all initial pairs $\{x_0, x_1\}$ such that $\{x_n\}$ is periodic.
- (ii) Find the set of all initial pairs $\{x_0, x_1\}$ such that $\{x_n\}$ has a limit.