Exercise

- Let be the difference equation $y_{n+1} = \frac{ay_n}{1+by_n}$, Find the fixed points of the equation. Where a and b are real number such that $a > 1$ and $b \neq 0$.

Solution:

Let $y_{n+1} = f(y_n)$. A point y_* in the domain of f is said to be an equilibrium point of the difference equation if it is a fixed point of f , i.e., $f(y_*) = y_*$. So we have:

$$f(y_*) = \frac{ay_*}{1+by_*} = y_*$$

$$y_* + by_*^2 = ay_*$$

$$y_* = 0 \qquad y_* = \frac{a-1}{b}$$