

$$a) \quad 1 - ax_{k+1} = 1 - ax_k + ax_k(1 - ax_k) = (1 - ax_k)^2.$$

$$\Rightarrow \quad 1 - ax_{k+1} = (1 - ax_k)^2 = (1 - ax_0)^{2^{k+1}}$$

$$\text{given. } |1 - ax_0| < 1.$$

$$\Rightarrow \quad \lim_{k \rightarrow \infty} (1 - ax_{k+1}) = 0.$$

$$\text{or } \lim_{k \rightarrow \infty} x_{k+1} = 1/a.$$

$$b) \therefore I - AX_{k+1} = (I - AX_k)^2 = (I - AX_0)^{2^{k+1}}.$$

$$\Rightarrow \quad \lim_{k \rightarrow \infty} AX_k = I.$$

$$\text{or } \lim_{k \rightarrow \infty} X_k = A^{-1}.$$