$x_0 = 4$; $x_{n+1} = \sqrt{x_n}$

$n=0$ $x_1 = \sqrt{x_0} = \sqrt{4} = 2$

$n=1$ $x_2 = \sqrt{x_1} = \sqrt{2} = (2)^{1/2}$

$n=2$ $x_3 = \sqrt{x_2} = \sqrt{\sqrt{2}} = (2)^{1/2^2}$

$n=3$; $x_4 = \sqrt{x_3} = \sqrt{\sqrt{\sqrt{2}}} = (2)^{1/2^3}$

|
y

$y_n = 2^n (x_n - 1)$ $\forall n \in \mathbb{N}$

$y_1 = 2^1 (x_1 - 1) = 2(2-1) = 2$

$y_2 = 2^2 (x_2 - 1) = 2^2(\sqrt{2}-1) = 2^2(2^{\frac{1}{2}} - 1)$

$y_3 = 2^3 (x_3 - 1) = 2^3 ((2)^{\frac{1}{2^2}} - 1)$

$y_4 = 2^4 (x_4 - 1) = 2^4 [(2)^{\frac{1}{2^3}} - 1)$

|
|

$y_K = 2^K (x_K - 1) = \underset{\text{monotonically increasing}}{2^K} \underbrace{((2)^{\frac{1}{2^{K-1}}} - 1)}_{\text{decreasing \& bounded}}$

d

$\lim_{n \to \infty} y_n = \lim_{n \to \infty} 2^n [(2)^{\frac{1}{2^{n-1}}} - 1)$

$= 0$