

Convergence of an iterative sequence

Source: <http://sci.tech-archive.net/Archive/sci.math/2008-03/msg04309.html>

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 - *Date:* Mon, 31 Mar 2008 02:02:33 -0700 (PDT)
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Consider the recursive relation,

$$x_k = f(x_{k-1}) + f(x_{k-2})$$

where f is non-negative, strictly decreasing and concave ($f'' > 0$) with $f(0)=1$ and $f(\infty)=0$.

Also, $x_0=0$

I would need to know if this always converges to the fixed point $x=2f(x)$, and why. How to solve this kind of problems? Any help would be appreciated.

Thanks in advance,

Jesús Cid.

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