Since we wish $y/x > 0$, then $a = (k + \sqrt{k^2+4})/2$ is selected. In reality, this leads naturally to the Fibonacci polynomials. Suppose again we start out with $f_0 = p$ and $f_1 = 1$, $f_2 = p - k$,

$$f_3 = 1 - k(p-k) = k^2 - kp + 1 = (k^2+1) - pk$$

$$f_4 = (p-k) - k(k^2 - kp + 1) = (-k^3 - 2k) + p(k^2+1) = -u_4(k) + pu_3(k)$$

$$f_n = (-1)^n [u_{n+1}(k) - pu_n(k)],$$

where $u_n(k)$ is the n^{th} Fibonacci polynomial. Once again $\lim_{n\to\infty} f_n$ does not exist unless

$$p = (k + \sqrt{k^2+4})/2;$$

then

$$f_n = (-1)^n u_n(k) \left(\frac{u_{n+1}(k)}{u_n(k)} - p \right).$$

$$\lim_{n\to\infty} f_n = 0$$

as before. When $k = 1 (un(1) = F_n)$ so that unless $p = a$, then

$$f_n = (-1)^n [u_{n+1}(k) - au_n(k) - (p-a)u_n(k)] = (-1)\cdot 1 + (-1)^n (a-p)u_n(k)$$

which diverges since $\lim_{n\to\infty} u_n(k) \to \infty$ for each $k > 0$.

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