9. Let a be a fixed number with $a > 0$. Set

$$g(x) = \frac{x^3 + 3ax}{3x^2 + a}.$$

Define a sequence $\{p_n\}$ by $p_{n+1} = g(p_n)$ and suppose that p_0 has been chosen so that the sequence $\{p_n\}$ converges to a number $p > 0$. What is p? Show that the order of convergence is equal to 3.