1062-39-67 **Chris D Lynd*** (chris_lynd@my.uri.edu). *Infinitely Nested Radicals as Particular Solutions to a General First-Order Difference Equation.*

The sequence

$$\{z_n\} = \{c_0 \cdot \sqrt[r_1]{a_1}, c_0 \cdot \sqrt[r_1]{a_1 + c_1 \sqrt[r_2]{a_2}}, \dots, c_0 \cdot \sqrt[r_1]{a_1 + c_1 \cdot \sqrt[r_2]{a_2 + \cdots + c_{n-1} \cdot \sqrt[r_n]{a_n}}}, \dots\},$$

when defined, is denoted by the *right nested root*

$$c_0 \sqrt[r_1]{a_1 + c_1 \sqrt[r_2]{a_2 + c_2 \sqrt[r_3]{a_3 + \dots}}}$$

We consider right nested roots where $\{c_n\}_{n=0}^{\infty}$ and $\{a_n\}_{n=0}^{\infty}$ are periodic sequences of real numbers and $\{r_n\}_{n=1}^{\infty}$ is a periodic sequence of integers greater than or equal to two. We show that right nested roots of this form can be produced from solutions to a difference equation.

We use the equilibrium points, periodic points, and their basins of attraction, to determine the convergence and limit points of the corresponding nested root. Our method of analysis extends previous convergence results to r^{th} roots, periodic parameters with an arbitrary period, and negative parameters. It also extends previous convergence results for *left nested roots*, and can be applied to continued fractions with periodic parameters.

In addition, for a general class of right nested roots, we demonstrate how to construct a nested root so that it converges to a predetermined number. (Received July 29, 2010)