

# Patterns of Boundedness and Global Stability of Some Rational Systems

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We investigate the boundedness character of the rational system:

$$x_{n+1} = \frac{\alpha_1 + \beta_1 x_n + \gamma_1 y_n}{A_1 + B_1 x_n + C_1 y_n} \quad \text{and} \quad y_{n+1} = \frac{\alpha_2 + \beta_2 x_n + \gamma_2 y_n}{A_2 + B_2 x_n + C_2 y_n}$$

with nonnegative parameters and with arbitrary nonnegative initial conditions such that the denominators are always positive. We have discovered that there exist 15 Patterns of Boundedness which describe in detail the boundedness behavior of this system. We also present some facts and some open problems and conjectures on the global character of rational systems. We believe that rational systems are prototypes for the development of the basic theory of nonlinear difference equations and nonlinear systems of difference equations.

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