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Equation with residuated functions

Abstract: The structure of solution-sets for the equation $F(x) = G(y)$ is discussed, where F, G are given residuated functions mapping between partially-ordered sets. An algorithm is proposed which produces a solution in the event of finite termination: this solution is maximal relative to initial trial values of x, y. Properties are defined which are sufficient for finite termination. The particular case of max-based linear algebra is discussed, with application to the synchronisation problem for discrete-event systems; here, if data are rational, finite termination is assured. Numerical examples are given. For more general residuated real functions, lower semicontinuity is sufficient for convergence to a solution, if one exists.