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Possible motivation of this study of equations x(t+1)=A x(t) + f(t,x(t)) may stem from the analysis of iterative algorithms in the applied linear algebra or from the theory of dynamical systems which are described by an n-dimensional time-dependent state-vector x(t). The propagator matrix A is considered, for definitness, in a partitioned and constant Jordan form with infinitesimally small off-diagonal matrix elements. The non-linearity f(t,x(t)) is assumed bounded at x=0 and Lifshitz-bounded elsewhere. Several theorems then postulate different forms of the spectrum of A (viz., less than one, bigger than one, mixed) and prove the existence (and establish the measure of uniqueness) of the solutions which remain continuous and/or bounded for all the real times t. Particular attention is paid to the weakly nonlinear case (Theorem 1 establishes the uniqueness of a bounded solution), to the left and/or right asymptotically vanishing solutions (Theorems 2, 3) and to their suitable generalization for mixed spectra.