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2. Algebra

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New central algorithms in linear algebra

In the textbook of the reference all suitable results of linear algebra are derived in algorithmic form. Besides the book contains six new central algorithms about generalized inverses, canonical forms of equivalent and similar matrices, spectral decomposition, testing of diagonalizability not using eigenvalues and efficient surefire approximation of all polynomial roots. The last three of these algorithms will be presented. The diagonalizability criterion can be stated here: The square matrix A with decomposable characteristic polynomial $p(t) = \det(tI - A)$ is diagonalizable iff the adjoint of $tI - A$ as a polynomial in t with matrix coefficients is divisible by the polynomial $\gcd(p(t), p'(t))$. Reference: H. Möller, Algorithmische Lineare Algebra. Verlag Vieweg, Wiesbaden 1997.