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The stability of equilibrium states described by an autonomous system of linear differential equations with constant real coefficients is studied. The cases when, among the eigenvalues of the matrix of coefficients of the system, there are simple or multiple zero eigenvalues or complex eigenvalues with zero real part (critical cases of the Lyapunov's general theory of stability) are discussed in detail. Stability criteria for the equilibrium states in critical cases are formulated using only information about the order of the matrix of coefficients, rank of the corresponding λ-matrix, and the multiplicity of the corresponding eigenvalues without reducing to the Jordan canonical form. Particular examples of the use of the proposed stability criteria are given. The dynamics of phase transitions due to thermal fluctuations for systems described by the Landau-type kinetic potential is discussed separately. An identity is given for matrices with a zero determinant and a given rank, which can be used to analyze the stability of solutions of