Asymptotic formulae for solutions of half-linear differential equations

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We are interested in asymptotic behavior of solutions of a half-linear differential equation. We will present, among others, asymptotic formulae for regularly varying solutions and rapidly varying solutions, and classify the solutions according to various aspects that take into account their asymptotic behavior. Our results can be understood in several ways. We generalize results for linear differential equations; some observations are new even in the linear case. We provide a refinement on information about behavior in standard asymptotic classes. We do an analysis of regularly varying solutions which are known to exist. We prove regular or rapid variation of all positive solutions. We show applications of a wide variety of tools in the asymptotic theory, like the Karamata theory of regular variation, the de Haan theory, the Riccati technique and its modifications, theory of differential inequalities, various transformations of dependent and independent variable, and the concept of principal solution. Directions for a future research will also be indicated.