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Review text:

Quantum mechanics makes an ample use of solvable models. Among them, a prominent place is being occupied by harmonic and Coulomb (or, if you wish, Kepler or hydrogen-atom) oscillators. In both cases, mathematically speaking, one merely employs the well known non-numerical solvability of the confluent hypergeometric ordinary differential equation. In particular, its bound-state (i.e., normalizable, i.e., Laguerre-polynomial) solutions are comfortably obtainable via appropriate recurrences with respect to the two integer parameters (the physical meaning of which is energy and angular momentum).

The history of this approach was most thoroughly described, as far as I know, by A. Stalhofen (in an unpublished Duke University preprint in 1989) and by Cooper et al (in their long review “Supersymmetry and quantum mechanics” published in Physics Reports 251 (1995) 267 - 385). The so called Schroedinger factorization form of this method interrelates bound states via the raising and lowering differential operators of the first order. The letter offers a compact derivation and complete and explicit list of its formulae for the hydrogen atom.