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Schrödinger Equation Solutions for small r and resulting Functional Relations

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Abstract: The Schrödinger equation is examined for small r (i.e. one step beyond the limit r $\rightarrow$ 0) for the cases V(r) $\rightarrow r^k$, (k>0), and V(r) $\rightarrow r^{-k}$ (0<k<2). In both cases the solutions are related to appropriate Bessel functions. This result may be used to obtain approximate functional relations involving Bessel functions. One such relation is derived in detail and illustrated graphically.

Key Words: Schrödinger equation, Bessel equation, Airy functions, Associated Laguerre functions