$$y'' + \omega^2 y = 0 \qquad \text{SHO}$$

$$x^2 y'' + xy' + (x^2 - \nu^2)y = 0 \qquad \text{Bessel}$$

$$(1 - x^2)y'' - 2xy' + l(l+1)y = 0 \qquad \text{Legendre}$$

$$(1 - x^2)y'' - 2xy' + \left[l(l+1) - \frac{m^2}{1 - x^2}\right]y = 0$$

$$xy'' + (1 - x)y' + \nu y = 0 \qquad \text{Laguerre}$$

$$y'' - 2xy' + 2\nu y = 0 \qquad \text{Hermite}$$

$$(1 - x^2)y'' - xy' + \nu^2 y = 0 \qquad \text{Chebyshev}$$