$$\left(-\frac{\hbar^2}{2m}\Delta + \frac{1}{2}m\omega^2 x^2\right)\psi(x) = E\,\psi(x). \tag{0.1}$$

$$\xi = \sqrt{\frac{m\omega}{\hbar}}\,x \quad \text{und} \quad n = \frac{2E}{\hbar\omega} \tag{0.2}$$

$$\psi(\xi) = H(\xi)\,\mathrm{e}^{-\xi^2/2} \tag{0.3}$$

$$H''(x) - 2xH'(x) + 2\nu H(x) = 0 \quad \text{mit} \quad \nu = 0, 1, 2, \ldots \tag{0.4}$$

$$H_\nu(x) = (-1)^\nu e^{x^2}\frac{d^\nu}{dx^\nu}\mathrm{e}^{-x^2} \tag{0.5}$$

Tabelle 0.1: Hermit-Polynome für $H_\nu(x)$ für $\nu = 0$ bis 3.

ν	$H_\nu(x)$
0	1
1	$2x$
2	$4x^2 - 2$
3	$8x^3 - 12x$

$$\psi_\nu(x) = \left(\frac{m\omega}{\pi\hbar}\right)^{\frac{1}{4}}\frac{1}{\sqrt{2^\nu \nu!}}\,H_\nu\left(\sqrt{\frac{m\omega}{\hbar}}x\right)\,\mathrm{e}^{-\frac{1}{2}\frac{m\omega}{\hbar}x^2}. \tag{0.6}$$