

$$\psi_n(\epsilon) = \frac{1}{\sqrt{2^n n!}} \left(\frac{m\omega}{\hbar} \right)^{1/4} e^{-\epsilon/2} H_n(\epsilon)$$

$$\begin{aligned}\epsilon &= x \\ H_1(x) &= 2x \\ n &= 1\end{aligned}$$

$$\psi_1(x) = \frac{1}{\sqrt{2^1 \cdot 1!}} \left(\frac{m\omega}{\hbar} \right)^{1/4} e^{-x/2} 2x$$

$$\sqrt{\frac{m\omega}{\hbar}} = 1$$

$$\frac{m\omega}{\hbar} = 1^2 = 1$$

$$\psi_1(x) = \frac{1}{\sqrt{2}} \left(\frac{1}{\hbar} \right)^{1/4} e^{-x/2} 2x$$

$$= \left(\frac{1}{4\hbar} \right)^{1/4} e^{-x/2} 2x$$

$$= \left(\frac{4}{\hbar} \right)^{1/4} x e^{-x^2/2}$$

$$\langle x^2 \rangle = \int_{-\infty}^{\infty} \left| \left(\frac{4}{\hbar} \right)^{1/4} x e^{-x^2/2} \right|^2 x^2 dx$$

$$= \left(\frac{4}{\hbar} \right)^{1/2} \int_{-\infty}^{\infty} x^4 e^{-x^2} dx = 1.5 \approx \frac{3}{2}$$

Function u integrir