$$\vec{F} = \int -k\vec{x}$$

$$U = \frac{1}{2}kx^2$$

$$\Psi(x) = Ae^{-\alpha x}$$
$$\Psi(x) = Axe^{\alpha x}$$
$$\Psi(x) = Ae^{-\alpha x^2}$$

$$\frac{-\hbar^2}{2m}\frac{\partial^2\Psi}{\partial x^2} + U\Psi = E\Psi$$

$$\frac{-\hbar^2}{2m}\frac{\partial^2\Psi}{\partial x^2} + \frac{1}{2}kx^2\Psi = E\Psi$$

$$\frac{\partial^2\Psi}{\partial x^2} = -(\frac{2m}{\hbar^2})(E - \frac{1}{2}kx^2)\Psi$$

$$\frac{\partial^2\Psi}{\partial x^2} = (\frac{2m}{\hbar^2})(\frac{1}{2}kx^2 - E)\Psi$$

$$\frac{\partial^2\Psi}{\partial x^2} = (\frac{m}{\hbar^2})kx^2\Psi - (\frac{2m}{\hbar^2})E\Psi$$

$$\frac{\partial^2\Psi}{\partial x^2} = (\frac{km}{\hbar^2})x^2\Psi - (\frac{2mE}{\hbar^2})\Psi$$

$$\frac{\partial^2\Psi}{\partial x^2} = -2\alpha\Psi + 4\alpha^2x^2\Psi$$