משמעות הערך העצמי

$$\hat{p}\psi(x) = p\psi(x)$$

$\hat{p}$ – אופרטור התנע

p – הערך העצמי

$$\hat{p} = -i\hbar \frac{\partial}{\partial x}$$

$$\psi_p(x) = \frac{1}{\sqrt{2\pi}} \cdot e^{\left(\frac{ikx}{\hbar}\right)}$$

$$\hat{p}\,\psi_p(x) = p\,\psi_p(x)$$

$$-i\hbar \frac{\partial}{\partial x} \frac{1}{\sqrt{2\pi}} \cdot e^{\left(\frac{ikx}{\hbar}\right)} = p \cdot \frac{1}{\sqrt{2\pi}} \cdot e^{\left(\frac{ikx}{\hbar}\right)}$$

$$-i\hbar \frac{\partial}{\partial x} \frac{1}{\sqrt{2\pi}} \cdot e^{\left(\frac{ikx}{\hbar}\right)} = p \cdot \frac{1}{\sqrt{2\pi}} \cdot e^{\left(\frac{ikx}{\hbar}\right)}$$

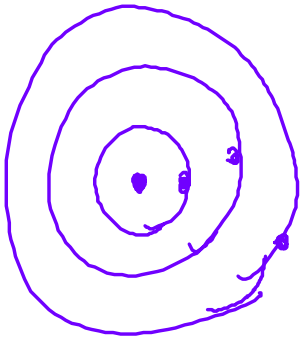
$$-i\hbar \cdot \frac{1}{\sqrt{2\pi}} \cdot \frac{ik}{\hbar} \cdot e^{\left(\frac{ikx}{\hbar}\right)} = p \cdot \frac{1}{\sqrt{2\pi}} \cdot e^{\left(\frac{ikx}{\hbar}\right)}$$

$$k \cdot \frac{1}{\sqrt{2\pi}} \cdot e^{\left(\frac{ikx}{\hbar}\right)} = p \cdot \frac{1}{\sqrt{2\pi}} \cdot e^{\left(\frac{ikx}{\hbar}\right)}$$

$$\boxed{p = k}$$

$$i = \sqrt{-1}$$

$$i^2 = \left(\sqrt{-1}\right)^2 = -1$$



$$k_n = 4 \cdot n \quad kg\frac{m}{s^2}$$

$$\psi_p(x) = \frac{1}{\sqrt{4\pi}} e^{\left(\frac{i \cdot 4n\, x}{\hbar}\right)}$$

$$p = k_n$$

$$\left.\begin{aligned} p_1 &= 4 \\ p_2 &= 8 \\ p_3 &= 12 \end{aligned}\right\} kg\frac{m}{s^2}$$

$$P = 4r$$