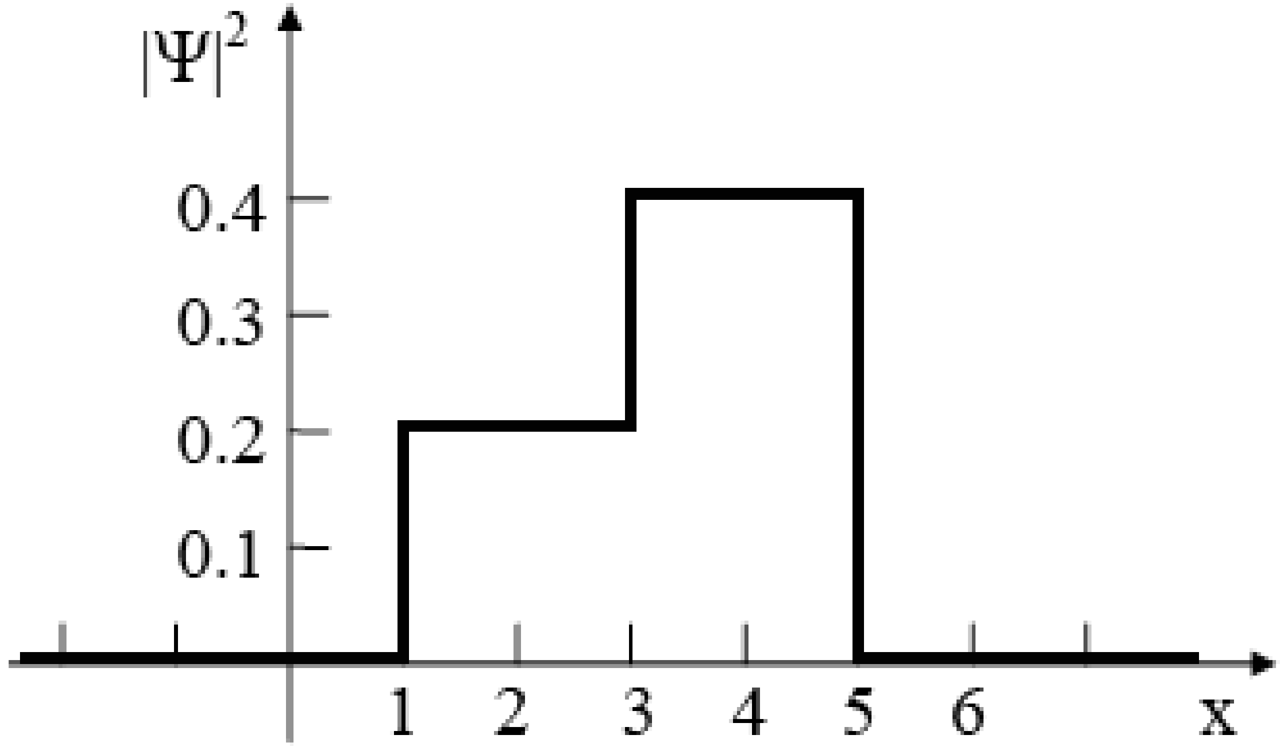
Postulates (continued)

Note Title 12-01-2011

1) Linear operater

2) Hermitian Operator

3) Expectation value



1) Is the wave function normalized?

2) What is the probability that a position measurement leads to a value betn 3 & 5?

Please use the reverse side of the sheet you have been given to answer the following questions.

1) List, with a short reason, a maximum of three things that you like about the course/teaching.
2) List, with a short reason, a maximum of three things that you least like about the course/teaching.
3) If you were the instructor what one thing would you change about/with the course?

Notes:
1) Use any trick to ensure anonymity to your feedback.
2) Room allotment, separation of CE and CS, class timings etc. are not acceptable discussion points.

Expectation value

$$\langle \hat{O}_p \rangle = \int \underline{\psi}^* \, \hat{O}_p \, \underline{\psi} \, d\tau \quad (\psi \text{ is normalized})$$

$P(x)$

$P(x)$

$$\langle x \rangle = \int x \, P(x) \, dx$$

$$\langle f(x) \rangle$$

$\hat{p}\,\psi$

$$\hat{p}_x = -i\hbar \frac{d}{dx} \quad A e^{ikx} = \hbar k \, A e^{ikx}$$

$$\hat{O}_p \, \psi_k = \text{constant} \times \psi_k$$

$$\langle p_x \rangle = \frac{\int A^* e^{-ikx} \, -i\hbar \frac{\partial}{\partial x} A e^{ikx} \, dx}{\int \psi^* \psi \, dx}$$

$$= \hbar k \int A^* e^{-ikx} A e^{ikx} \, dx$$

$$\int \psi^* \psi \, dx$$

Standard deviation analogy

$$\langle \Delta Op \rangle = \sqrt{\langle Op^2 \rangle - \langle Op \rangle^2}$$

Uncertainty in the measurement

$$SD = \sqrt{\langle x^2 \rangle - \langle x \rangle^2}$$

$$\langle \Delta Op \rangle = \sqrt{\langle Op^2 \rangle - \langle Op \rangle^2}$$

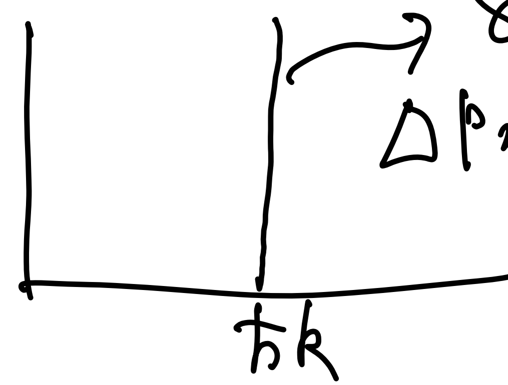
Free particle with sharp momentum $(\hbar k)$

$$\Delta p_x = 0$$

$$\langle p_x \rangle^2 = (\hbar k)^2$$

$$\langle p_x^2 \rangle = \hbar^2 k^2$$

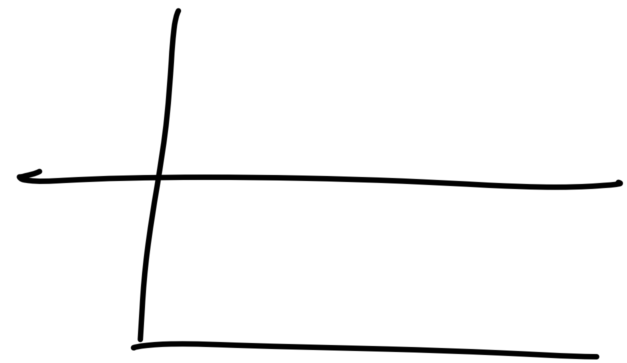
δ- function



$\Delta p_x = 0$

$$\Delta x = \sqrt{\langle x^2 \rangle - \langle x \rangle}$$

$$\psi = A e^{ikx}$$



$$\Delta p_x = 0$$

$$\psi^* \psi = |A|^2$$

$$\Delta x \, \Delta p_x \geq \hbar/2$$

$$\Delta x \, \Delta p_y = 0$$

$$\Delta x \, \Delta y = 0$$

$$\int A^* e^{-ikx} x^2 A e^{ikx} \, dx - \left(\int A^* e^{-ikx} x A e^{ikx} \, dx \right)^2$$

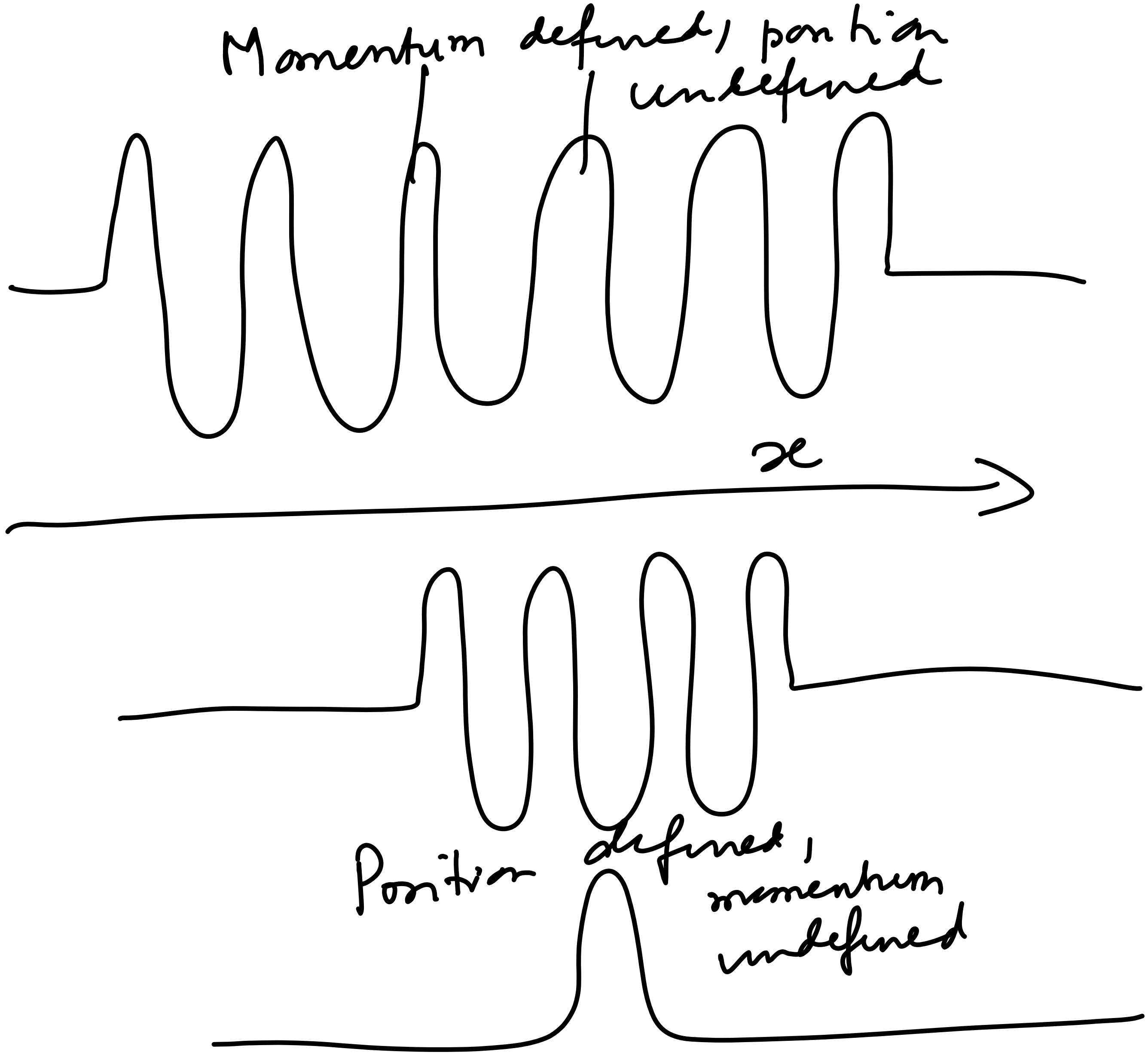
$$\Delta p_x$$

$\sin kx$

$\hbar = 1$

$\Delta x \sim n\lambda$

$\dfrac{\Delta k}{k} \sim \dfrac{1}{n}$



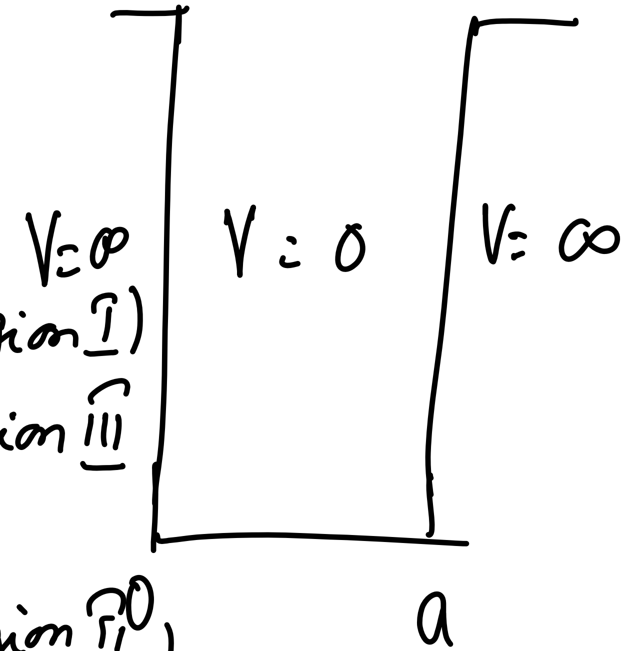
Particle in an infinite well (PIB)

$$\hat{\mathcal{H}} = \hat{T} + \hat{V}$$

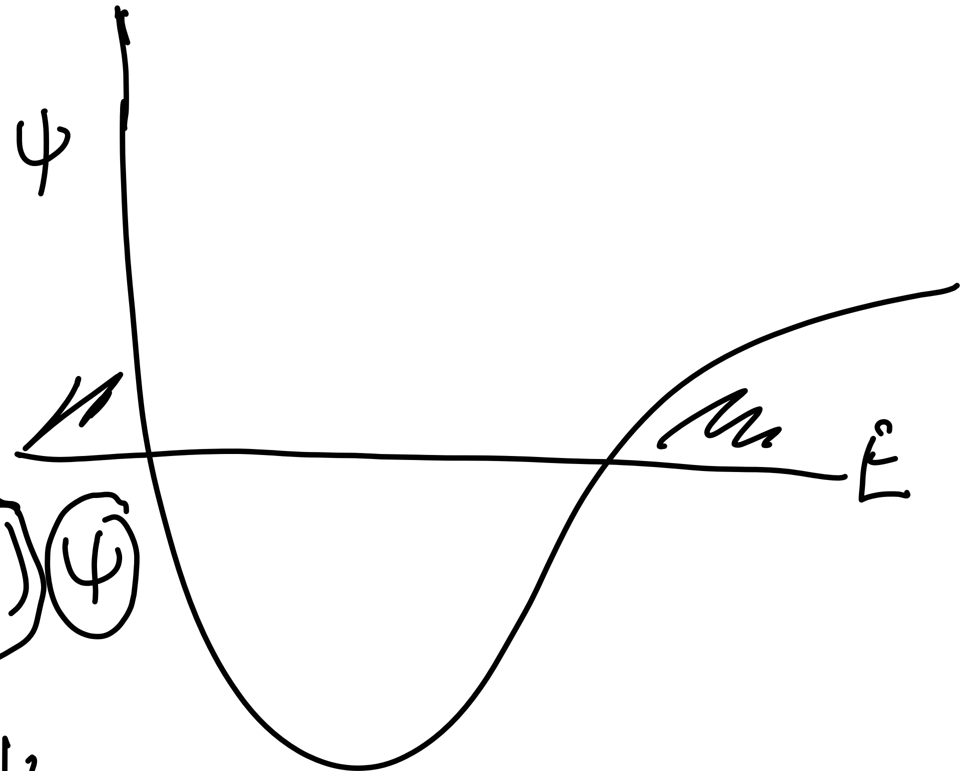
$$= -\frac{\hbar^2}{2m}\frac{d^2}{dx^2} + \infty \text{ (region I)}$$

region III

$$-\frac{\hbar^2}{2m}\frac{d^2}{dx^2} \quad \text{(region II)}$$



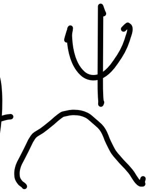
$$\hat{H} = -\frac{\hbar^2}{2m}\frac{d^2\psi}{dx^2} + V(x)\psi$$



$$\hat{H}\psi = E\psi$$

$$\frac{d^2\psi}{dx^2} = \frac{2m}{\hbar^2}(V-E)\psi$$

curvature $\propto$ ψ



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