

Problem #4 Fall 2003

$$A(\phi_1 + \phi_2) = a_1 \phi_1 + a_2 \phi_2$$

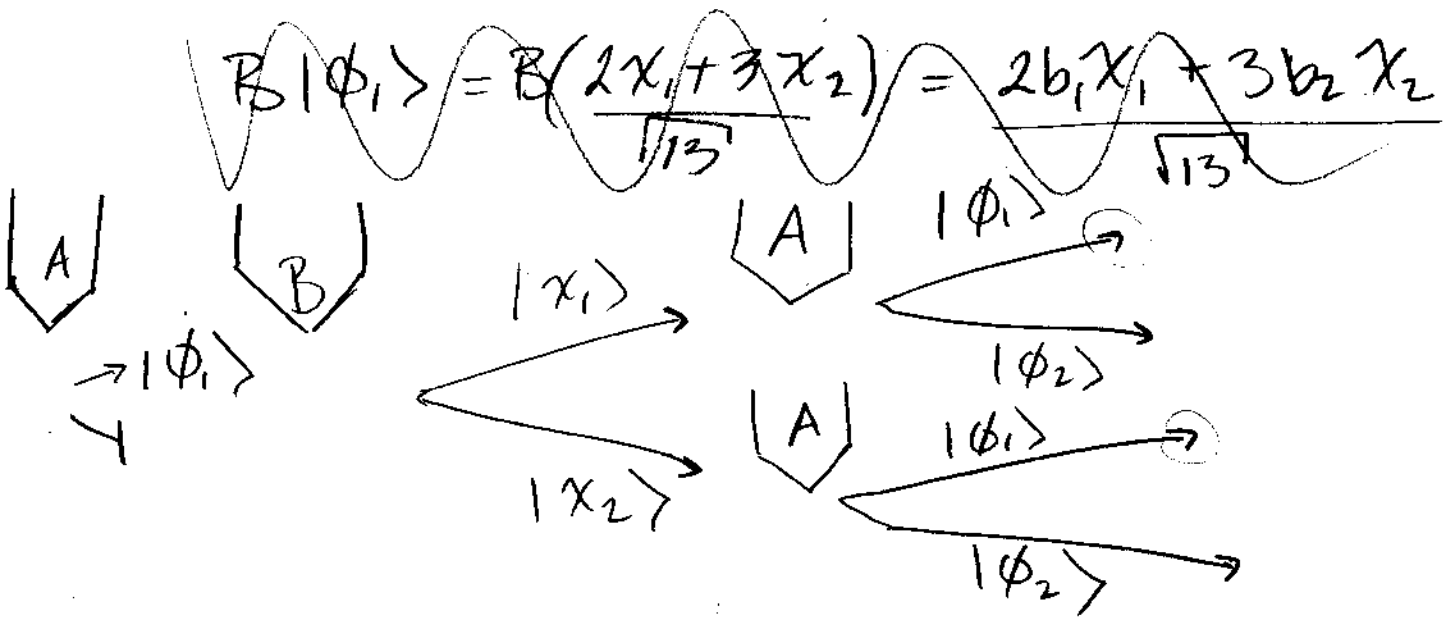
$$B(x_1 + x_2) = b_1 x_1 + b_2 x_2$$

$$\phi_1 = (2x_1 + 3x_2) / \sqrt{13}$$

$$\phi_2 = (3x_1 - 2x_2) / \sqrt{13}$$

because we measure A first, then we know that after we measure A, we have an eigenstate of A

If $42\hbar = a_1$, then we have the state ϕ_1 when we get around to measure B



$$\text{(B)} \quad P_{b_1} = |\langle \chi_1 | I | \phi_1 \rangle|^2 = \frac{4}{13} \rightarrow \text{path ①}$$

$$P_{b_2} = |\langle \chi_2 | I | \phi_1 \rangle|^2 = \frac{9}{13} \rightarrow \text{path ②}$$

$$\text{(A)} \quad \text{Path ①} \quad P_{a_1} = |\langle \phi_1 | \chi_1 \rangle|^2 = \frac{4}{13}$$

$$\text{Path ②} \quad P_{a_2} = |\langle \phi_1 | \chi_2 \rangle|^2 = \frac{9}{13}$$

$$P_{\phi_1} = \left(\frac{4}{13}\right)^2 + \left(\frac{9}{13}\right)^2$$

→ what if start with $|\phi_2\rangle$?

$$P = \left| |\langle \chi_1 | \phi_2 \rangle|^2 \right|^2 + \left| |\langle \chi_2 | \phi_2 \rangle|^2 \right|^2$$

$$P = \left(\frac{9}{13}\right)^2 + \left(\frac{4}{13}\right)^2$$

SAME

$$P = \frac{97}{169} \quad \checkmark$$