

$$(1) \quad \left[-\frac{\hbar^2}{2m} \frac{d^2 \psi}{dx^2} + V(x) \right] \psi(x) = E \psi(x)$$

$$\begin{aligned} \hat{D} \hat{D} f(x) &= \hat{D} f'(x) \hat{D} (x^2 + 3e^{2x}) = \\ &= 2x + 6e^{2x} \hat{3} \\ &= 3x^2 + 9e^x x^2 + \\ &= 1 \tan(x^2 + 1) \hat{A} f(x) g(x) \hat{A} f(x) = \\ &= g(x) \hat{A} \hat{B} \end{aligned}$$

$$(2) \quad (\hat{A} + \hat{B}) f(x) \equiv \hat{A} f(x) + \hat{B} f(x)$$

$$\begin{aligned} (\hat{A} - \hat{B}) f(x) &\equiv \hat{A} f(x) - \hat{B} f(x) \\ \hat{D} &\equiv d/dx \\ (\hat{D} + \hat{3}) (x^3 - 5) &= \hat{D} (x^3 - 5) + \hat{3} (x^3 - 5) = \\ &= 3x^2 + (3x^3 - 15) = \\ &= 3x^3 + 3x^2 - 15 \\ &= \partial^2/\partial x^2 + \partial^2/\partial y^2 \\ &= (\partial^2/\partial x^2 + \partial^2/\partial y^2) g(x, y) = \\ &= \partial^2 g/\partial x^2 + \partial^2 g/\partial y^2 \end{aligned}$$

$$(3) \quad \hat{A} \hat{B} f(x) = \hat{A} \left[\hat{B} f(x) \right]$$

$$\begin{aligned} f(x) \hat{3} \hat{D} f(x) &= \hat{3} \left[\hat{D} f(x) \right] = \\ \hat{3} f'(x) &= 3 f'(x) \\ \hat{A} \hat{B} \hat{B} \hat{A} d/dx \hat{x} \hat{x} \end{aligned}$$

$$(4) \quad \hat{D} \hat{x} f(x) = \frac{d}{dx} [x f(x)] = f(x) + f'(x) = \left(\hat{1} + \hat{x} \hat{D} \right) f(x)$$

$$\begin{aligned} \hat{x} \hat{D} f(x) &= \hat{x} \left[\frac{d}{dx} f(x) \right] = \\ x f'(x) &= \hat{A} \hat{B} \hat{B} \hat{A} f \hat{A} f = \\ \hat{B} f \hat{A} \hat{B} \quad ?? \end{aligned}$$

$$(5) \quad \hat{D} \hat{x} = 1 + \hat{x} \hat{D}$$

$$\begin{aligned} \hat{1} \hat{0} \\ ?? \hat{D} \hat{x} - \\ \hat{x} \hat{D} - \\ \hat{1} = \end{aligned}$$

$$(6) \quad \hat{A} (\hat{B} \hat{C}) = (\hat{A} \hat{B}) \hat{C}$$

$$\begin{aligned} ?? \hat{A} &= d/dx \hat{B} = \\ \hat{3} \hat{C} &= \end{aligned}$$