7.4 $\nabla\psi = i\frac{\not{p}}{\hbar}\psi$

$\nabla\cdot\nabla\psi = \frac{(i)^2}{\hbar^2}\not{p}\cdot\not{p}\,\psi = -\frac{p^2}{\hbar^2}\psi$

(a) $\dot{\psi} = -i\frac{E}{\hbar}\psi,$

Schrödinger:

$-\frac{\hbar^2}{2m}\left(-\frac{p^2}{\hbar^2}\psi\right) = i\hbar\left(-i\frac{E}{\hbar}\psi\right)$

$\Rightarrow \frac{p^2}{2m}\psi = E\psi$ ✓

(b) Klein-Gordon:

$-\hbar^2c^2\left(-\frac{p^2}{\hbar^2}\psi\right) + m^2c^4\psi = -\hbar^2\left(-i\frac{E}{\hbar}\right)^2\psi$

$c^2p^2\psi + m^2c^4\psi = +E^2\psi$ ✓

(c) Set $c=\hbar=1$ units and rewrite

$\frac{\partial^2}{\partial t^2}\psi - \nabla^2\psi + m^2\psi = 0$

$\Rightarrow \partial_\mu\partial^\mu\psi + m^2\psi = 0$ ✓