

Physics 4261: Homework 11 (due Apr. 17, 2017)

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11.1. **Foot 10.4** [ignore part (d)]

11.2. **Foot 10.8**

11.3. **Foot 10.10**

(a) Use the trial wavefunction

$$\begin{aligned}\psi &= [\psi_0 + ue^{i(kx-\omega t)} + v^*e^{-i(kx-\omega t)}] e^{-i\mu t/\hbar} \\ &= [\psi_0 + \delta\psi(t)] e^{-i\mu t/\hbar},\end{aligned}$$

instead. Furthermore show that the second equation is

$$\mu\delta\psi + i\hbar\frac{d}{dt}(\delta\psi(t)) = \frac{\hbar^2k^2}{2M}\delta\psi(t) + g|\psi_0|^2 2\delta\psi(t) + g\psi_0^2\delta\psi^*(t).$$