PHY 6646 - Quantum Mechanics II - Spring 2018
Homework #8, due March 14

1. Show that the free particle one-dimensional Schrödinger equation is invariant with respect to Galilean transformations. Do this by showing that, when the transformation $x \to x' = x - vt$, $t \to t' = t$ is applied, the transformed wavefunction $\psi'(x', t') = f(x, t)\psi(x, t)$, where $f(x, t)$ is a phase factor, is a solution with respect to the primed variables if $\psi(x, t)$ is a solution with respect to the unprimed ones provided $f(x, t)$ satisfies certain conditions. Find the required form of $f(x, t)$. Show that the traveling wave solution $\psi(x, t) = Ae^{i(kx - \omega t)}$ transforms as expected.

2. Problem 12.3.7