PHY 6646 - Quantum Mechanics II - Spring 2020
Homework set # 8, due March 11

1. A particle of mass μ moves in a one-dimensional harmonic oscillator potential $V(x) = \frac{1}{2}\mu\omega^2 x^2$. Allowing for relativistic effects, the kinetic energy is $T = E - \mu c^2 = \sqrt{\mu^2 c^4 + p^2 c^2} - \mu c^2 \simeq \frac{p^2}{2\mu} - \frac{p^4}{8\mu^3 c^2}$. Treating the p^4 term as a perturbation, calculate the first order shift in the ground state energy.

2. Problems 17.2.4, 17.2.5, 17.2.7, 17.2.8, 17.3.1 and 17.3.2 in Shankar's book.