PHYS 4073 - Quantum Mechanics- Homework Set 5

Reading Assignment: Chapter 3

Due at the beginning of class Friday October 15th.

Griffiths' Problems

3.13

3.17

3.22

3.23

3.25

3.37

Additional Problems

A1 Compute the uncertainty relation between the kinetic energy and the potential energy for the simple harmonic oscillator.

A2 Find the differential equation for the time evolution of the expectation value of the kinetic energy for the simple harmonic oscillator.

A3 Show that the classical equations of motion are recovered for the Simple Harmonic Oscillator(SHO) by examining the time evolution of the average position and momentum.

A4 Using the normalized raising and lowering operators, verify that the uncertainty principle is satisfied for the ground state of the SHO.

A5 Using the normalized raising and lowering operators, write the matrices representing the $\hat{X}$ and $\hat{P}$ operators in the energy basis.