Homework 8: Formal Aspects
(**Due Friday November 9**)

November 5, 2018

1 HERMETIAN OPERATORS **(30 POINTS)**

1. **Prove** that the eigenvalues of a hermetian operator are real. **Hint: use the definition of a hermetian operator**

2. **Prove** that the eigenstates of a hermetian operator are orthogonal. **Hint: assume that ψ_1 and ψ_2 are two eignestates of the same hermetian operator with different eigenvalues. Then, use the definition of a hermetian operator.**

2 MANIPULATIONS **(40 POINTS)**

1. Do problem 3.4 in Griffiths' book

2. Do problem 3.5 in Griffiths' book

3 AN EIGENVALUE PROBLEM **(30 POINTS)**

The Hamiltonian of a two-level system is given by

$$\hat{H} = \begin{bmatrix} \hbar\omega & \hbar\epsilon \\ \hbar\epsilon & \hbar\omega \end{bmatrix}, \tag{3.1}$$

where $\omega > \epsilon$. **Find** the eigen-energies and eigenstates of this Hamiltonian.