Computational Quantum Physics

Week 4

Due on Week 6

Exercise 1: **Continuous time-ind. S.E.**

Consider the one-dimensional quantum harmonic oscillator defined by the Hamiltonian

$$H = \hat{p}^2 + \omega^2 \hat{q}^2$$

(a) Write a Fortran program to compute the first k eigenvalues E_k and eigenvectors $|\psi_k\rangle$.

(b) How would you rate your program in terms of the priorities we introduced in class for good scientific software development (Correctness, Stability, Accurate discretization, Flexibility, Efficiency)?