Homework 6: The Harmonic Oscillator
(**Due Friday October 26**)

October 20, 2018

1 BRUTE FORCE CALCULATIONS **(30 POINTS)**

Using the technology of the ladder operators, **start** from ψ_0 of the harmonic oscillator and **find** the normalized eigenstates ψ_1, ψ_2, and ψ_3. Plot $|\psi_0|^2$, $|\psi_1|^2$, and $|\psi_2|^2$.

2 VARIOUS PROBLEMS WITH THE HARMONIC OSCILLATOR **70 POINTS)**

1. **(35 points)** Do problem 2.12 in Griffiths' book

2. **(35 points)** Given that the initial wave function of a harmonic oscillator is given by $\Psi(x, t = 0) = \frac{1}{\sqrt{2}}\psi_0 + \frac{1}{\sqrt{2}}\psi_1$, **find** $\Psi(x, t)$ and $\langle x \rangle(t)$.