**PHYS 232 Assignment 10 due:10 am Wednesday May20,2020**

1. Consider a particle of mass $m$ moving in a two-dimensional harmonic oscillator potential

$$U\left(x,y\right)= \frac{1}{2}mω^{2}\left(x^{2}+y^{2}\right)$$

1. Use separation of variables in Cartesian coordinates to solve the Schroedinger equation for this particle.

(20%)

1. Write down the normalized wavefunction and energy for the ground state of this particle.

(10%)

1. What is the energy and degeneracy of each of the lowest 5 energy levels of this particle**?**

(10%)

1. Consider the wavefunction

Ψ(r,θ,φ) = A(1 – br) exp[-br]

1. Show that this wavefunction satisfies the Schroedinger equation for the Hydrogen atom with *zero angular momentum.* What is its energy eigenvalue? What is b? To what state does this wavefunction correspond?

(20%)

1. NormalizeΨ(r,θ,φ).

(10%)

1. Calculate P( r ).

(10%)