

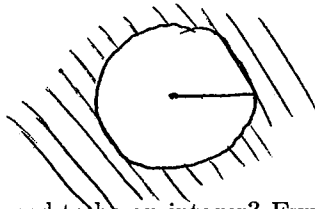
Physics 4803
Homework Assignment 2
Due Sept 10 at 5:00

1) In class we solved the infinite circular well. The infinite circular well is now replaced by a half-circular well?



- a) What is the solution for the Θ equation in this case.
- b) Do the energy eigenvalues change? Explain.

2) The infinite circular well now has a "baffle" in it.



- a) Does n_θ still need to be an integer? Explain

3) Consider the 2-D harmonic oscillator in cartesian coordinates.

$$V(x,y) = \frac{1}{2}k(x^2 + y^2).$$

- a) What are the energy eigenvalues?
- b) For the energy $E=5\hbar\omega$, what is the level of degeneracy?
- c) Write down all combinations of quantum numbers that give an energy of $5\hbar\omega$.

4) Solve the 2-D harmonic oscillator in $r-\phi$ space, $V(r,\theta) = \frac{1}{2}kr^2$.

- a) What are the energy eigenvalues?
- b) For the energy $E=5\hbar\omega$, what is the level of degeneracy?
- c) Write down all combinations of quantum numbers that give an energy of $5\hbar\omega$.
- d) Do you expect the same answers for 3 a) and 4 a)? How about for 3 b) and 4 b)? How about for 3 c) and 4 c)? Explain.