

## Chem 2430 HW #1

1. Normalize  $\psi = e^{-ax^2}$  on  $-\infty \leq x \leq \infty$

Calculate the probability of finding a particle between  $x=0$  and  $1$  if described with this wavefunction

2. Show that the  $n=2$  and  $n=4$  wavefunctions for the particle-in-box problem are orthogonal

3. Consider the potential  $V = \infty, x \leq 0, V = 0, x > 0$ . For a wavefunction  $\psi = c_1 e^{ikx} + c_2 e^{-ikx}$ , solve for  $c_1$  and  $c_2$ . (Actually, find the relation between  $c_1$  and  $c_2$ . Do not worry about normalization.)

What is the energy of the particle? Assume the mass is  $m$ .