

Name & Section _____

Student Number _____

Chemistry 483

Examination 1
September 19, 2008

1. (50 points) Define and/or characterize

a. photon

b. line spectrum

c. node

d. Bohr orbit

e. Kronecker delta

Name _____
Student Number _____

f. correspondence principle

g. Hamiltonian for a particle confined to a cube

h. Harmonic oscillator

i. stationary state

j. eigenfunction

Name _____

Student Number _____

2. (15 points) A ground-state hydrogen atom absorbs a photon of light that has a wavelength of 97.2 nm. It then gives off a photon that has a wavelength of 486 nm. What is the final state of the hydrogen atom?

Name _____
Student Number _____

3. (10 points) Given that the work function of Chromium is 4.40 eV, calculate the kinetic energy (in eV) of the electrons emitted from a Chromium surface that is irradiated with ultraviolet radiation of wavelength 200 nm.

Name _____

Student Number _____

4. (10 points) In each case, show that $f(x)$ is an eigenfunction of the operator given. Find the eigenvalue.

	Operator	$f(x)$
(a)	$\frac{d^2}{dx^2}$	$\cos \omega x$
(b)	$\frac{d}{dt}$	$e^{i\omega t}$
(c)	$\frac{d^2}{dx^2} + 2\frac{d}{dx} + 3$	e^{ax}
(d)	$\frac{\partial}{\partial y}$	$x^2 e^{6y}$

Name _____
Student Number _____

5.(15 points) The force constant of $^{79}\text{Br}^{79}\text{Br}$ is 240 Nm^{-1} . Calculate the fundamental vibrational frequency and the zero-point energy of $^{79}\text{Br}^{79}\text{Br}$.