CHM 3411, Dr. Chatfield, February 19, 2018

Exam 1

You may use a calculator (non-graphing), but nothing else. If you need extra room, use the back of exam pages and direct the grader (Dr. Chatfield) where to look. You may also use scratch paper, but ***put all final answers on the exam itself and attach any scratch paper with work the grader should read.***. ***Read all problems carefully***. Set up problems methodically, show your work, and be neat. Partial credit will be given when it is possible for me to follow your work. If you are having trouble with a problem, go on to the next and come back.

GOOD LUCK!

Constants:

$h = 6.626 \times 10^{-34}\ Js$ $\hbar = \frac{h}{2\pi}$ $m_e = 9.11 \times 10^{-31}\ kg$ $c = 3.00 \times 10^{8}\ m\ s^{-1}$

$k = 1.38 \times 10^{-23}\ J\ K^{-1}$ $N_A = 6.022 \times 10^{23}\ mol^{-1}$ $amu = 1.66 \times 10^{-27}\ kg$

Equations (others are given directly in exam questions):

$\lambda = \frac{h}{p}$ $\Delta x \Delta p \geq \frac{\hbar}{2\pi}$ $\lambda \nu = c$ $\tilde{\nu} = \frac{1}{\lambda}$ $\Delta E = h\nu = \hbar\omega$ $d\tau = r^2 sin\theta dr d\theta d\phi$

$\widehat{H} = \frac{-\hbar^2}{2m}\frac{d^2}{dx^2} + \hat{V}(x)$ $\widehat{H} = \frac{-\hbar^2}{2m}\nabla^2 + \hat{V}(x)$
