CHEM 131 **Name** _____
Quiz 1 – August 28, 2019

Complete the following problems. Write your final answers in the blanks provided. You must show your work to receive full credit. Show your answers to the correct number of significant figures with the correct units.

1. Consider light with wavelength of 410 nm.
   a. What is the energy of a photon of this light? (4 pts)

Answer_____

   b. An electronic transition in a hydrogen atom, starting at $n_i = 7$, produces light of 410 nm wavelength. What is the final n for this transition? REMEMBER: n is an integer! (5 pts)

Answer_____

2. Determine if each of the sets of quantum numbers below is **valid** or **invalid**, given the rules of quantum mechanics. For each set that is **invalid** provide a brief explanation of what makes the set invalid. (8 points)

   a. $n = 3, \ell = 3, m_\ell = 1$

   b. $n = 3, \ell = 1, m_\ell = -1$

   c. $n = 3, \ell = 2, m_\ell = 3$

   d. $n = 2, \ell = 0, m_\ell = 0$

3. Sketch an example of each of the two orbitals below. For each orbital indicate the number of radial and angular nodes. (8 pts)

Orbital	n = 2, $\ell = 1$	n = 4, $\ell = 0$
Sketch		
Number of Radial Nodes		
Number of Angular Nodes		

Possibly Useful Information

$h = 6.626 \times 10^{-34}$ J s	$c = 2.998 \times 10^{8}$ ms^{-1}	$E = h\upsilon = \frac{hc}{\lambda}$	$\Delta E \bullet \Delta(mv) > h$
$R_H = 2.179 \times 10^{-18}$ J/atom	$E = -\frac{R_H}{n^2}$	$\Delta E = R_H\left(\frac{1}{n_f^2} - \frac{1}{n_i^2}\right)$	$H\psi = E\psi$