QUANTUM NUMBERS WORKSHEET

1. Name the orbitals described by the following quantum numbers

   a. n = 3, l= 0
   b. n = 3, l = 1
   c. n = 3, l = 2
   d. n = 5, l = 0

2. Give the n and ℓ values for the following orbitals

   a. 1s
   b. 3s
   c. 2p
   d. 4d
   e. 5f

3. What are the possible values of m for the following types of orbitals?

   a. s
   b. p
   c. d
   d. f

4. How many possible orbitals are there for n =

   a. 4
   b. 10

5. How many electrons can inhabit all of the n=4 orbitals?

6. Tabulate (as in make a table!) all of the possible orbitals (by name, e.g. 4s) for n=4 and give the three quantum numbers which define each orbital.

7. Consider each of the following sets of quantum numbers (n, ℓ, m, s). Decide if each set is valid or not valid. For valid sets, identify the orbital the set describes (*e.g.* 2*p*). For sets that are not valid, explain why the set is not valid.

a) $n = 2$, $\ell = 1$, m = 0, s = ½

b) $n = 0$, $\ell = 0$, m = 0, s = ½

c) $n = 3$, $\ell = 2$, m = −2, s = −½

d) $n = 3$, $\ell = -2$, m= 3, s = ½

e) $n = 4$, $\ell = 3$, m = 2, s = −1

8. What is the maximum number of electrons that can be contained within the region (energy level, sublevel, orbital) specified by the following quantum numbers?

a) n = 3

b) n = 4, ℓ = 2

c) n = 2, ℓ = 0, m = 0

9. Indicate the maximum number of electrons in an atom that can have as part of their set of four quantum numbers for each of the following:

a. n = 2

b. n = 3, ℓ = 1

c. n = 4, ℓ = 2

d. n = 6, ℓ = 3 m = -2

e. n = 3, ℓ = 1 m = 0

f. n = 7, ℓ = 5 m_l = 2 s = ½