

## Quantum Numbers Worksheet

1. Label each of the following sets of four quantum numbers as either Valid, which indicates that set is a legitimate set of quantum numbers for an electron, or Invalid, which would indicate that the set is not a possible set of quantum numbers for an electron. (*Hint: Check them with the rules on the quantum numbers handout you got*)

n	$\ell$	$m_\ell$	$m_s$	Valid or Invalid?
1	0	0	$\frac{1}{2}$	
1	1	+1	$-\frac{1}{2}$	
2	0	0	$-\frac{1}{2}$	
2	2	-2	$\frac{1}{2}$	
2	1	-1	$\frac{1}{2}$	
3	2	-1	$\frac{1}{2}$	
3	1	0	0	
3	0	1	$\frac{1}{2}$	
3	0	0	$-\frac{1}{2}$	
1	2	-3	$\frac{1}{2}$	

- An electron is in a certain energy level where the maximum value of the quantum number  $\ell = 4$ . What energy level is the electron in?
- How does the size of a given type of orbital vary with  $n$ ?
- How many orbitals are there in an  $h$  subshell ( $\ell=5$ )? What are their values of  $m_\ell$ ?
- Give the complete set of quantum numbers for all the electrons that could populate the 3d subshell of an atom.