PRACTICE PROBLEMS

1) Identify the subshell in which electrons with the following quantum numbers are found:
a. $n = 2, l = 1$
b. $n = 4, l = 2$
c. $n = 6, l = 0$

2) Consider the orbitals shown here in outline.

(x) (y)

a. What is the maximum number of electrons contained in an orbital of type (x)? Of type (y)?
b. How many orbitals of type (x) are found in a shell with $n = 2$? How many of type (y)?
c. Write a set of quantum numbers for an electron in an orbital of type (x) in a shell with $n = 4$. Of an orbital of type (y) in a shell with $n = 2$.
d. What is the smallest possible n value for an orbital of type (x)? Of type (y)?
e. What are the possible l and m_l values for an orbital of type (x)? Of type (y)?

3) How many electrons could be held in the second shell of an atom if the spin quantum number m_s could have three values instead of just two?

4) Describe the electrons/orbitals defined by the following quantum numbers:

	n	l	m_l
(i)	3	0	0
(ii)	2	1	1
(iii)	4	2	-1
(iv)	3	3	2
(v)	3	1	2

5) What is the maximum number of orbitals with:
(i) n = 4 l = 1
(ii) n = 2 l = 2
(iii) n = 3 l = 2
(iv) n = 5 l = 1 ml = -1

6) The number of electrons in Cr atom that have quantum numbers l=0 and m_l =-1

7) Write the electron configuration of Mn. In a box orbital diagram, show the electrons having following 4 quantum numbers.

(i) n=3 l=2 ml=-1 ms=+1/2
(ii) n=2 l=1 ml=0 mc=-1/2
(iii) n=3 l=3 ml=-2 ms=+1/2

Answers

1)

a) 2p
b) 4d
c) 6s

2)

a) x=2 y=2
b) x=1 y=3
c) x= 4 0 0 1/2
d) x= 1 y=2
e) x: l=0, ml=0 y: l=1 ml=-1 0 or +1

3) 12

4)

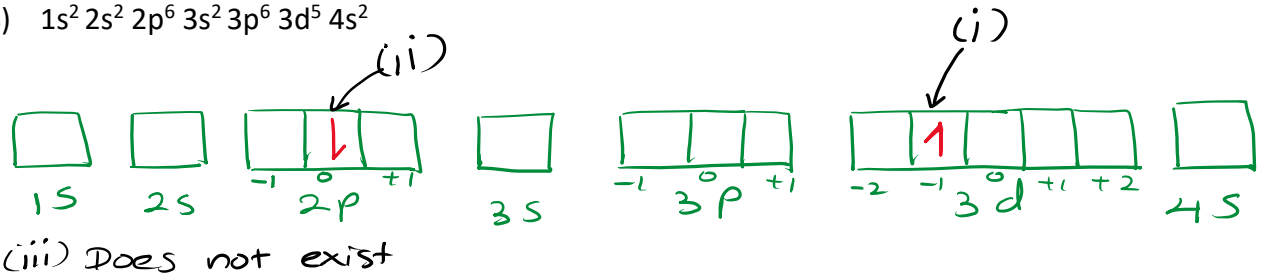
(i) 3s electron or orbital
(ii) 2p electron or orbital
(iii) 4d electron or orbital
(iv) not allowed (l must be < n)
(v) not allowed (ml must be between -l and l)

5)

(i) 3 (the 4p orbitals)
(ii) none (does not exist)
(iii) 5 (the 3d orbitals)
(iv) 1 (defines one unique p orbital)

6) l=0 5 electron ml=-1 5 electrons

8) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^5\ 4s^2$



(iii) Does not exist