

1. All of the 4d orbitals (no way to distinguish based on given info)
2. if  $l=1$ ,  $m$  cannot  $=-2$  or  $2$
3. Electrons repel because of negative charge. With opposite spin the magnetic field of the electrons causes an attraction that approximately balances the electric repulsion allowing them to share space. Since there are only two types of spin, only two electrons can have their electric repulsion balanced in this way.
4. Schrodinger writes his eqn assuming that electrons are (or at least can be treated as) waves. Something that De Broglie's work allowed.
5. See key to other form
6. Difference between the last two is that the  $\Psi^2$  graph starts infinitely high and the other starts at zero. This is because the  $\Psi^2$  graph looks at the probability of measuring the electron in a point of space (high near the nucleus since opposite charges attract) and the other graph takes into account the size of the space (zero at the origin and still really small in the nucleus).
7. Hs:  $[\text{Rn}] 7s^2 5f^{14} 6d^6$   
 Si:  $[\text{Ne}] 3s^2 3p^2$   
 Mo:  $[\text{Kr}] 5s^1 4d^5$   
 Os:  $[\text{Xe}] 6s^2 4f^{14} 5d^6$   
 Os<sup>+2</sup>:  $[\text{Xe}] 4f^{14} 5d^6$   
 Os<sup>+3</sup>:  $[\text{Xe}] 4f^{14} 5d^5$
8. Os+3. All orbital groups are either filled, half filled or empty
9. Electrons in nucleus answer = bad. S fixed by saying that electrons could be in nucleus but small probability because space is small  
 math doesn't work for more than one electron (because of extra forces – repulsions and multiple attractions). S fixed with wave math (waves interfere, they don't repel)  
 quantum leaping is impossible. S fixed by saying that orbitals overlap so electrons don't need to move from place to place.