Multi-electron atoms worksheet

- 1. For each of the following: indicate how this factor *alone* would affect the ionization energy of the electron (i.e., no other changes than the one stated). What would happen to the ionization energy of the electron if ...
 - a. ... the nuclear charge were to increase (*Z* increases)
 - b. ... if the electron had more loops? e.g., if it were 3s instead of 2s (new shell)
 - c. ... if another electron, with fewer loops, were also present? e.g., what would happen to the ionization energy of a 2*p* electron if there were also a 1*s* electron present in the atom? (increased shielding)
 - d. ... if another electron with the same quantum numbers (n, l, m_l) , but opposite spin (m_s) , were present? (electronelectron repulsion)
 - Trend in ionization energy compared to previous atom, and explanation Atom Ζ **Electron configuration** Н 1 $1s^1$ This is the first element *IE* of He is higher than H because He has a larger nuclear charge, but the 2 $1s^{2}$ He electron being ionized is still n = 1. 3 ?? ?? Li ...
- 2. Complete the following table for all of the elements from He to P.

- 3. The following questions are all about manganese (Mn).
 - a. What is the ground-state electron configuration of Mn?
 - b. The radial electron density diagrams for the different electron orbitals of Mn are given on the next page. Assign each by writing the name of the orbital in the box provided. The first one (on the right) is done for you. Hints: (1) draw the orbitals you listed in (a), and (2) look carefully at the *x* axes.
 - c. Based on the diagrams, what do you predict about the atomic radius of Mn? Hint: what is the electron configuration of a neutral Mn atom (part a)?



