

Additional answers to problem 5 on assignment 9

Note: the answer, as given in the problem, needs to be multiplied by a_0 .

Here's a list of additional "check-points" for problem 5:

$$\langle r \rangle = \frac{a_0}{2} [3n^2 - l(l+1)]$$

$$\langle r^2 \rangle = \frac{a_0^2 n^2}{2} [5n^2 + 1 - 3l(l+1)]$$

The following list may also be useful in other problems you might encounter in the future:

$$\langle r^k \rangle \equiv \int_0^\infty r^{k+2} [R_{nl}(r)]^2 dr$$

$$\left\langle \frac{1}{r} \right\rangle = \frac{1}{a_0 n^2}$$

$$\left\langle \frac{1}{r^2} \right\rangle = \frac{1}{a_0^2 n^3 (l + 1/2)}$$