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Quiz 28

1.

Bohr radius	$r_n = a_0 n^2$
Rydberg Equation	$E_n = -\dfrac{\Re}{n^2}$

Amplitude of wavefunction inside core: $\psi_n(r) \propto n^{-3/2}$ (innermost lobe)

$$E_{n+\delta/2} - E_{n-\delta/2} = \frac{2\delta\Re}{n^3}$$

A. How does the transition probability $\left(\text{proportional to } \left|\langle 1s|r|np\rangle\right|^2\right)$ for the $1s \rightarrow np$ Rydberg series scale with n? [**HINT**: 1s is *entirely* inside the core; only the innermost lobe of np is inside the core.]

B. The transition probability density (proportional to $\left|\langle 1s|r|np\rangle\right|^2 / \left[E_{n+1/2} - E_{n-1/2}\right]\right)$ is supposed to be constant as n $\rightarrow \infty$ and beyond into the ionization continuum. Show that this is true. [**HINT**: Use the n-scaling of the numerator from Part A; use the n-scaling of the denominator from the box above.]

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