Problem#5 (5 points)
Calculate the longest and shortest wavelengths of the Lyman series of the Be^{3+} ion (Z = 4).

$$\frac{1}{\lambda} = R\left(\frac{1}{n_f^2} - \frac{1}{n_i^2}\right) Z^2$$

for lyman series $n_f = 1$

$$\frac{1}{\lambda_{long}} = R\left(\frac{1}{1} - \frac{1}{4}\right)(4^2) = 12R$$

$$\lambda_{long} = \frac{1}{12R} = 7.59 \times 10^{-9}\,m = \boxed{7.59\,nm}$$

$$\frac{1}{\lambda_{short}} = R\left(\frac{1}{1} - \frac{1}{\infty}\right)(4^2) = 16R$$

$$\lambda_{short} = \frac{1}{16R} = 5.70 \times 10^{-9}\,m = \boxed{5.70\,nm}$$