Lecture 5 Problems

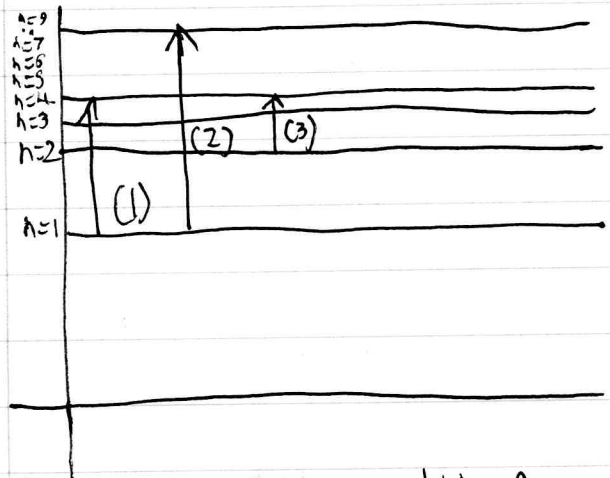
Problem 1

(1): $\frac{-hR}{4^2} - \frac{-hR}{1^2} = -hR\left(\frac{1}{16} - 1\right) = 6.82 \cdot 10^{-27}$ J

(2): $6.94 \cdot 10^{-28}$ J

(3): $1.36 \cdot 10^{-27}$ J

(4):



Let's try this with $R = 3.29E15$ like a normal proton.

(1): $-hR\left(\frac{1}{16} - 1\right) = 2.04E-18$

(2): $-hR\left(\frac{1}{64} - \frac{1}{9}\right) = 2.08E-19$

(3): $-hR\left(\frac{1}{16} - \frac{1}{4}\right) = 4.09E-19$

Problem 2

(1): $4 \cdot 13.6 = 54.4\ eV = 8.716E-18\ J$

(2): $E = h\nu =$ 11

$\lambda \nu = c \Rightarrow \nu = \frac{c}{\lambda}$

$8.716E-18 = \frac{hc}{\lambda} \Rightarrow \lambda = 22.8\ nm$

Problem 3

(1): $E = \frac{hc}{\lambda} = \frac{hc}{10^{-7} \cdot 5{,}37} = 3{,}7 \cdot 10^{-19}\ J$

(2): $2 \cdot 6{,}022 \cdot 10^{23} \cdot 3{,}7 \cdot 10^{-19}\ J = 446\ kJ$

Problem 4

(1): Schrodinger's ~~num~~ equation tells us about the ~~light~~ frequencies of light energized atoms will emit and absorb.