8.51) a) What is r_{mp} for the 1s e^- in Ni^{27+}?
b) What's its binding energy?

For Nickel, $Z = 28$

The most probable radius for the 1s e^- is the Bohr radius adjusted for the multiple p^+ in the nucleus

$$r_{mp} = \frac{a_B}{Z} = \frac{5.29 \times 10^{-11} m}{28} = 1.89 \times 10^{-12} m \qquad (8.100)$$

$$\Rightarrow \boxed{r_{mp,\,Ni^{27+}} = 1.89\ pm}$$

b) The binding energy is simply the potential energy of the 1s e^- "seeing" 28 p^+:

$$B = E_{n=1} = -Z^2 \frac{E_R}{n^2} = (28)^2(13.6) \qquad (8.99)$$

$$B = 10662\ eV = \boxed{10.7\ keV = B}$$