[Cheng P.3-41] Einstein's theory of relativity stipulates that the work required to assemble a charge is stored as energy in the mass and is equal to mc^2, where m is the mass, and $c \cong 3 \times 10^8$ (m/s) is the velocity of light. Assuming the electron is a perfect sphere, find its radius from its charge and mass (9.31×10^{31} kg).

Solution: From Eq. (3-169), $W = \dfrac{3e^2}{20\pi\varepsilon_0 b} = mc^2$ and $b = \dfrac{3e^2}{20\pi\varepsilon_0 mc^2} = 1.69 \times 10^{-15}$ m

Answer: $b = 1.69 \times 10^{-15}$ m