3.9 This problem asks for us to calculate the radius of a tantalum atom. For BCC, $n = 2$ atoms/unit cell, and

$$V_C = \left(\frac{4R}{\sqrt{3}}\right)^3 = \frac{64\,R^3}{3\sqrt{3}}$$

Since, from Equation 3.5

$$\rho = \frac{nA_{Ta}}{V_C N_A}$$

$$= \frac{nA_{Ta}}{\left(\dfrac{64\,R^3}{3\sqrt{3}}\right)N_A}$$

and solving for R the previous equation

$$R = \left(\frac{3\sqrt{3}nA_{Ta}}{64\rho\,N_A}\right)^{1/3}$$

$$= \left[\frac{(3\sqrt{3})(2\ \text{atoms/unit cell})(180.9\ \text{g/mol})}{(64)(16.6\ \text{g/cm}^3)(6.023\ \text{x}\ 10^{23}\ \text{atoms/mol})}\right]^{1/3}$$

$$= 1.43\ \text{x}\ 10^{-8}\ \text{cm} = 0.143\ \text{nm}$$