7.9 This problem asks that we compute the magnitudes of the Burgers vectors for copper and iron. For Cu, which has an FCC crystal structure, R = 0.1278 nm (Table 3.1) and $a = 2R\sqrt{2}$ = 0.3615 nm (Equation 3.1); also, from Equation 7.1a, the Burgers vector for FCC metals is

$$\mathbf{b} = \frac{a}{2}\langle 110\rangle$$

Therefore, the values for u, v, and w in Equation 7.10 are 1, 1, and 0, respectively. Hence, the magnitude of the Burgers vector for Cu is

$$|\mathbf{b}| = \frac{a}{2}\sqrt{u^2 + v^2 + w^2}$$

$$= \frac{0.3615\ \text{nm}}{2}\sqrt{(1)^2 + (1)^2 + (0)^2} = 0.2556\ \text{nm}$$

For Fe which has a BCC crystal structure, R = 0.1241 nm (Table 3.1) and $a = \frac{4R}{\sqrt{3}}$ = 0.2866 nm (Equation 3.3); also, from Equation 7.1b, the Burgers vector for BCC metals is

$$\mathbf{b} = \frac{a}{2}\langle 111\rangle$$

Therefore, the values for u, v, and w in Equation 7.10 are 1, 1, and 1, respectively. Hence, the magnitude of the Burgers vector for Fe is

$$|\mathbf{b}| = \frac{0.2866\ \text{nm}}{2}\sqrt{(1)^2 + (1)^2 + (1)^2} = 0.2482\ \text{nm}$$