

37. (a) The current in R_1 is given by

$$i_1 = \frac{\mathcal{E}}{R_1 + R_2 R_3 / (R_2 + R_3)} = \frac{5.0 \text{ V}}{2.0 \Omega + (4.0 \Omega)(6.0 \Omega) / (4.0 \Omega + 6.0 \Omega)} = 1.14 \text{ A} .$$

Thus

$$i_3 = \frac{\mathcal{E} - V_1}{R_3} = \frac{\mathcal{E} - i_1 R_1}{R_3} = \frac{5.0 \text{ V} - (1.14 \text{ A})(2.0 \Omega)}{6.0 \Omega} = 0.45 \text{ A} .$$

(b) We simply interchange subscripts 1 and 3 in the equation above. Now

$$\begin{aligned} i_3 &= \frac{\mathcal{E}}{R_3 + (R_2 R_1 / (R_2 + R_1))} \\ &= \frac{5.0 \text{ V}}{6.0 \Omega + ((2.0 \Omega)(4.0 \Omega) / (2.0 \Omega + 4.0 \Omega))} \\ &= 0.6818 \text{ A} \end{aligned}$$

and

$$i_1 = \frac{5.0 \text{ V} - (0.6818 \text{ A})(6.0 \Omega)}{2.0 \Omega} = 0.45 \text{ A} ,$$

the same as before.