

12. (a) We solve  $i = (\mathcal{E}_2 - \mathcal{E}_1)/(r_1 + r_2 + R)$  for  $R$ :

$$R = \frac{\mathcal{E}_2 - \mathcal{E}_1}{i} - r_1 - r_2 = \frac{3.0 \text{ V} - 2.0 \text{ V}}{1.0 \times 10^{-3} \text{ A}} - 3.0 \Omega - 3.0 \Omega = 9.9 \times 10^2 \Omega .$$

- (b)  $P = i^2 R = (1.0 \times 10^{-3} \text{ A})^2 (9.9 \times 10^2 \Omega) = 9.9 \times 10^{-4} \text{ W}.$