38. (a) Since $i = \mathcal{E}/(r + R_{ext})$ and $i_{max} = \mathcal{E}/r$, we have $R_{ext} = R(i_{max}/i - 1)$ where $r = 1.50$ V/1.00 mA $= 1.50 \times 10^3\ \Omega$. Thus,

$$R_{ext} = (1.5 \times 10^3\ \Omega)\ (1/0.100 - 1) = 1.35 \times 10^4\ \Omega.$$

(b) $R_{ext} = (1.5 \times 10^3\ \Omega)\ (1/0.500 - 1) = 1.50 \times 10^3\ \Omega$.

(c) $R_{ext} = (1.5 \times 10^3\ \Omega)\ (1/0.900 - 1) = 167\ \Omega$.

(d) Since $r = 20.0\ \Omega + R$, $R = 1.50 \times 10^3\ \Omega - 20.0\ \Omega = 1.48 \times 10^3\ \Omega$.