(1) [15 points]. In the circuit given in the figure:

- Find $i = \text{the current supplied by the battery}$. 
- $V_3 = \text{the voltage across } R_3$. 
- $i_1 = \text{the current through } R_1$. 

\[ E = 100 \text{ V}, \quad R_1 = 100 \, \Omega, \quad R_2 = 100 \, \Omega, \quad R_3 = 400 \, \Omega, \quad \text{and } R = 600 \, \Omega. \]

(2) [10 points]. A conductor is in the shape of a cylinder of length 5.0 mm and radius 1.0 mm. A current is flowing through it with current density magnitude $5.0 \times 10^5 \text{ A/m}^2$. The conductor has resistivity $3.0 \times 10^{-2} \, \Omega \text{m}$. What is the voltage across the conductor?