1.)

a.)

(i) Because $R = \rho \frac{\ell}{A}$, the conductor with the largest length and smallest cross sectional area will have the highest resistance.

Therefor b is the answer

(ii) conductor C will have the least resistance

b.) $R = \rho \frac{\ell}{A}$ where $A = \pi r^2$

if the dianater is doubled, the area is quadroupled.

Because $R \propto \frac{1}{A}$, the resistance will be $\frac{1}{4}$ of what it was.

2.) $I = \frac{\Delta Q}{\Delta t}$ $\therefore$ $Q = I \Delta t$

a.)

$Q = 300 \times 3 = 900$ Coulombs

b.) $900 \times 6.24 \times 10^{18} = 5.616 \times 10^{21}$ electrons

3.)

a.) $R = \rho \frac{\ell}{A}$ $\therefore$ $A = \rho \frac{\ell}{R}$

$\rho = 1.7 \times 10^{-8}$, $\ell = 20$, $R = 0.1$

$A = 1.7 \times 10^{-8} \frac{20}{0.1} = 3.4 \times 10^{-6} m^2$

$A = \pi r^2$ $\therefore$ $r = \sqrt{\frac{A}{\pi}}$

Diamater $= 2.08 \times 10^{-3}$ m or 2.08mm

b.) $V = IR$ $V = 4 \times 0.1$

$V = 0.4$ volts

4.) a.)

$$R = R_0\left[1 + \alpha(T - T_0)\right]$$

$$R = R_0 + \alpha R_0(T - T_0)$$

$$\frac{R - R_0}{\alpha R_0} = T - T_0$$

$$T = \frac{R - R_0}{\alpha R_0} + T_0$$

$$T = \frac{187.4 - 164.2}{3.927 \times 10^{-3} \times 164.2} + 20$$

$$T = 55.979 \text{ or } 60°C$$