#1

25.2

$d = 2.6\ mm$
$q = 420\ C$
$t = 80\ m$
$e = 5.8 * 10^{28}$

a) $I = \frac{420\ C}{80\ min} * \frac{1\ min}{60\ s} = 0.0875\ C/s$

$I = 0.0875\ C/s$

b) $I = nqA\vec{v} \Rightarrow \vec{v} = \frac{I}{nqA}$

$$\vec{v} = \frac{0.0875}{(5.8*10^{28})(1.6*10^{-19})(\pi*(1.3*10^{-2})^2)} = 1.78*10^{-6}\ m/s$$

$v = 1.78 * 10^{-6}\ m/s$

#2

25.3

$I = 5.00\ A$
$d = 2.05\ mm$
$n = 8.5 * 10^{28}\ e^-/m^3$

a) $Q = (5)(1) = 5.00\ C$

$$e^- = \frac{Q}{e} = \frac{5}{1.6*10^{-19}} = 3.125*10^{19}$$

$e^- = 3.12 * 10^{19}$

b) $J = \frac{I}{A} = \frac{5}{\pi\left(\frac{2.05*10^{-3}}{2}\right)^2} = 1514859.6$

$J = 1.5 * 10^6\ A/m^2$

c) $J = nq\vec{v}_d \Rightarrow \vec{v}_d = \frac{J}{nq} = \frac{1.5*10^6}{(8.5*10^{28})(1.6*10^{-9})} = 1.11*10^{-4}$

$v_d = 1.11 * 10^{-4}\ mm/s$

d) La densidad de corriente y la velocidad cambiarían, el número de electrones por el tiempo sigue igual.

25.4 #3

$d = 1.02\ mm$

$J = 3.20 \times 10^6\ A/m^2$

$n = 8.5 \times 10^{28}\ e^-/m^3$

a) $I = JA$

$I = (3.20 \times 10^6)\left(\pi\left(\frac{1.02 \times 10^{-3}}{2}\right)^2\right)$

$I = 2.61\ A$

$I = 2.61\ A$ //4

b) $J = nqv_d$

$v_d = \frac{J}{nq} = \frac{3.20 \times 10^6}{(8.5 \times 10^{28})(1.6 \times 10^{-19})} = 2.35 \times 10^{-4}\ m/s$

$v_d = 2.35 \times 10^{-4}\ m/s$ //4

25.7 #4

$I = 55\ A - (0.65\ A/s^2)\,t^2$

a) $t = 0s$ - $t = 8.0s$

$I = \frac{dQ}{dt} \Rightarrow dQ = I\,dt$ // $\int$

$Q = \int I\,dt = \int_0^8 (55 - 0.65t^2)\,dt$

$Q = \left[55t - \frac{0.65}{3}t^3\right]\Big|_0^8 = \left[55(8) - \frac{0.65}{3}(8)^3\right] - 0 =$

$Q = 329.06\ C$

$Q = 329\ C$ //1

b) $I = \frac{Q}{t}$

$I = \frac{329}{8} = 41.12\ A$

$I = 41.1\ A$ //

25.15 #15

$l = 15.0\ cm$
$d = 1.00\ mm$
$T_0 = 20°C$
$T = 120°C$
$I = 12.5\ A$

$J = \frac{I}{A}$

a) $\rho = \frac{E}{J} \Rightarrow E = \rho J$

$\rho(T) = \rho_0 [1 + \alpha (T - T_0)]$

$E = \rho_{20} \cdot [1 + 0.0045(120 - 20)] \left[\frac{12.5}{\pi (0.0005)^2}\right]$

$E = (5.25 \times 10^{-8})[1 + 0.45](15.91 \times 10^6) =$

$E = 1.21\ V/m$

$E = 1.21\ V/m$ //

b) $R = \frac{\rho l}{A} = \frac{(7.61 \times 10^{-8})(0.150)}{\pi (0.0005)^2} = 0.0145$

$R = 0.0145\ \Omega$ //

c) $V = El = (1.21)(0.15) = 0.182\ V$

$V = 0.182\ V$ //

25.19 #6

$R = 5.60\ \mu\Omega$
120 hilos

a) $R = \frac{5.60 \times 10^{-6}}{120} = 4.67 \times 10^{-8}\ \Omega$

$R_N = 4.67 \times 10^{-8}\ \Omega$ //

b) $R = (5.60 \times 10^{-6})(120) = 6.72 \times 10^{-4}\ \Omega$.

$R = 6.72 \times 10^{-4}\ \Omega$ //

25.21 #7

$d = 0.84\ mm$
$E = 0.49\ V/m$
$\rho = 2.44 \times 10^{-8}\ \Omega \cdot m$

a) $I = JA$.

$I = \frac{E}{\rho} A = \frac{0.49}{2.44 \times 10^{-8}} \left(\pi \left(\frac{0.84 \times 10^{-3}}{2}\right)^2\right)$

$I = 11.13\ A$.

$I = 11.1\ A$ //

b) $x = 6.4\ m$.

$V = El$
$V = (0.49)(6.4)$
$V = 3.136\ V$.

$V = 3.14\ V$ //

c) $R = \frac{V}{I} = \frac{3.136}{11.13} =$

$R = 0.2817\ \Omega$

$R = 0.28\ \Omega$ //