Answers Test 2010

1. 1) $V\left(\frac{A}{2}\right) - V(2B) = \frac{\lambda}{\pi\varepsilon_0} \ln 2$

2. a) $V_2 = \frac{V_1}{R_1}\left(R_3 + R_4\right)$

   b) $Q = 0$

3. a) $r = A_1 + T \qquad \sigma = \frac{Q_0}{4\pi(A_1+T)^2}$

   $r = B_1 \qquad \sigma = -\frac{Q_0}{4\pi B_1^2}$

   $r = B_1 + T \qquad \sigma = \frac{Q_0}{4\pi(B_1+T)^2}$

   b) $V(A_1) - V(B_1+T) = \frac{Q_0}{4\pi\varepsilon_0}\left(\frac{1}{A_1+T} - \frac{1}{B_1}\right)$

   c) $C = \frac{4\pi\varepsilon_0}{B_1 - A_1 - T} B_1 (A_1+T)$

   d) $Q_0 + 0 = \tilde{Q}_0 + \tilde{Q}_1 \qquad C_1 = \frac{4\pi\varepsilon_0 B_2 (A_2+T)}{B_2 - A_2 - T}$

   $\tilde{Q}_0/C = \tilde{Q}_1/C_1$

4. a) $E_1 = \frac{V}{L}$ to the right

   $E_2 = \frac{V}{L}$ to the right

   b) $i_1 = \frac{V W_1 H}{\rho_1 L}$

   $i_2 = \frac{V W_2 H}{\rho_2 L}$

   c) $i_2 = \frac{2V W_2 H}{3\rho_0 L}$; $i = i_1 + i_2 = \frac{V W_1 H}{\rho_1 L} + \frac{2V W_2 H}{3\rho_0 L}$