$$= 0.107$$

Now, solving for A in Equation 18.11

$$A = \frac{\rho_i}{c'_{\mathrm{Ni}}\left(1 - c'_{\mathrm{Ni}}\right)}$$

$$= \frac{1.73 \times 10^{-7}\ (\Omega - \mathrm{m})}{(0.107)(1 - 0.107)} = 1.81 \times 10^{-6}\ (\Omega - \mathrm{m})$$

Now it is possible to compute the c'_{Ni} to give a room temperature resistivity of 2.5 x 10^{-7} Ω-m. Again, we must determine ρ_i as

$$\rho_i = \rho_{\mathrm{total}} - \rho_t$$

$$= 2.5 \times 10^{-7} - 1.67 \times 10^{-8} = 2.33 \times 10^{-7}\ (\Omega - \mathrm{m})$$

If Equation 18.11 is expanded, then

$$\rho_i = A c'_{\mathrm{Ni}} - A c'^{2}_{\mathrm{Ni}}$$

Or, rearranging this equation, we have

$$A c'^{2}_{\mathrm{Ni}} - A c'_{\mathrm{Ni}} + \rho_i = 0$$

Now, solving for c'_{Ni} (using the quadratic equation solution)

$$c'_{\mathrm{Ni}} = \frac{A \pm \sqrt{A^2 - 4A\rho_i}}{2A}$$

Again, from the above

$A = 1.81 \times 10^{-6}$ (Ω-m)
$\rho_i = 2.33 \times 10^{-7}$ (Ω-m)