Problem 1.

Consider the two flux equations describing diffusion in a binary system:

\[ j_A = -\rho D_{AB} \nabla w_A \]

\[ j_B = -\rho D_{BA} \nabla w_B \]

Prove \( D_{AB} = D_{BA} \).

Problem 2.

Consider the two flux equations describing diffusion in a binary system:

\[ j_A = -\rho D_{AB} \nabla w_A \]

\[ j^* = -c D_{AB}^* \nabla x_A \]

Prove \( D_{AB} = D_{AB}^* \).

Problem 3. Problem BSL 2nd Ed: 17.A.1


Problem 5. Problem BSL 2nd Ed: 17.A.10

Problem 6. Problem BSL 2nd Ed: 17.B.3
The following relations may prove useful.

\[ j_A = -\rho_A (v_A - v) \]

\[ j^*_A = -\rho_A (v_A - v^*) \]

\[ j_A^* = -c_A (v_A - v^*) \]

\[ j_A^* = -c_A (v_A - v^*) \]

\[ v = \sum_{\alpha=1}^{n_c} w_\alpha v_\alpha \]

\[ v^* = \sum_{\alpha=1}^{n_c} x_\alpha v_\alpha \]

\[ w_\alpha = \frac{x_\alpha m_\alpha}{\sum_{\beta=1}^{n_c} x_\beta m_\beta} \]

\[ \frac{\rho_\alpha}{c_\alpha} = \frac{\rho}{c x_\alpha} = m_\alpha \]