

- A. Graph P_1/P_1^0 vs. ϕ_1 for $\chi_1 = 0, 0.25, 0.50, 0.75$ and 1.0 at $N=100$ and at $N=1000$. Overlay on each of the two graphs that of ideal solution prediction, given by (2)

$$P_1 / P_1^0 = \phi_1 \cdot \exp \left[\left(1 - \frac{1}{N} \right) (1 - \phi_1) + \chi_1 (1 - \phi_1)^2 \right] \quad (1)$$

$$P_1 / P_1^0 = X_1 = \frac{N\phi_1}{N\phi_1 + (1 - \phi_1)} \quad (2)$$

- B. Plot $-\frac{\mu_1 - \mu_1^0}{RT}$ vs. ϕ_2 for a range of $0 \leq \phi_2 \leq 0.05$ for $\chi_1 = 0, 0.50, 0.532, 0.54, 0.55$ and 0.56 at $N=1000$. Find the inflection point by setting

$$\left(\frac{\partial \mu_1}{\partial \phi_1} \right)_{T,P} = 0, \text{ and } \left(\frac{\partial^2 \mu_1}{\partial \phi_1^2} \right)_{T,P} = 0$$

and determine $\chi_{1,C}$ and $\phi_{2,C}$ at the inflection point.

$$-\frac{\mu_1 - \mu_1^0}{RT} = -[\ln(1 - \phi_2) + (1 - \frac{1}{N})\phi_2 + \chi_1 \phi_2^2] \quad (3)$$

- C. 3.15
 D. 3.18
 E. 3.21
 F. 3.24
 G. 3.25
 H. 3.26
 I. 3.27