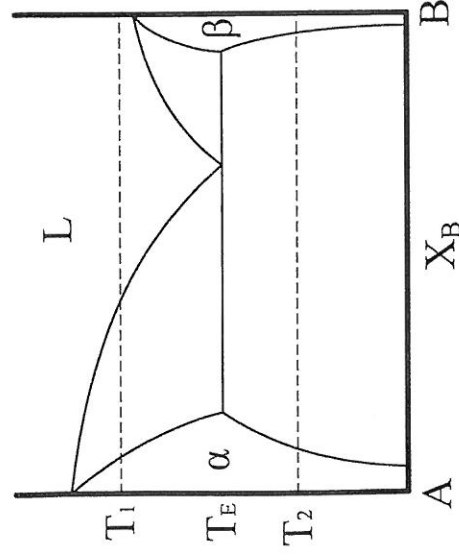


- Interpret the followings:
 - Raoult's law. (5%)
 - Henry's law. (5%)
 - Regular solution. (5%)
 - Chemical potential. (5%)
 - Gibbs-Duhem equation. (5%)
- For an ideal gas mixture, what are the enthalpy change, entropy change, and Gibbs energy change after mixing? (10%)
- Plot the respective Gibbs free energy curves, G_α , G_β and G_L at three different temperatures, T_1 , T_E and T_2 , according to the following simple eutectic phase diagram. (15%)



- Please derive the thermodynamic equation of state $\left(\frac{\partial H}{\partial P}\right)_T = V - T \left(\frac{\partial V}{\partial T}\right)_T$. (15%)
- For the ideal gas, please prove $C_p - C_v = R$. (15%)
- Carnot cycle is a reversible cyclic process which consists of four steps. Please show the diagram and the entropy change for each step. (20%)