CM 3230 Fall 2011
Quiz 6a

Name _____

Circle the correct answers, each question is worth 20 points. (Bonus of 20 if all 6 are correct).

1. For a liquid solution having 30% A and 70% B, the activity coefficients were found to be $\gamma_A = 1.2$ and $\gamma_B = 2$. Then,

   a) $g^E/(RT) = 0.11$
   b) $g^E/(RT) = 0.36$
   c) $g^E/(RT) = 0.54$
   d) None of the above

2. For a binary vapor mixture in equilibrium with a liquid solution, the fugacity of A was found to by $\hat{f}_1^v = 2$ bars. The liquid composition was found to be $x_A = 0.5$ with an activity coefficient of 1. Assuming that the $P^{sat} = 4.3\ bars$ and $\phi_1^{\text{sat}} = 1$, then the Poynting correction, ϵ_P, is

   a) $\epsilon_P = 0.72$
   b) $\epsilon_P = 0.93$
   c) $\epsilon_P = 1.07$
   d) None of the above

3. A mixture containing 65 mole % A and 35 mole% B at $T = 300K$ and $P = 2$ bar$s$ was found to have an excess Gibbs free energy $g^E = -10\ kJ/mol$. Then Δg_{mix} is

   a) $\Delta g_{mix} = -8.4\ \frac{kJ}{mol}$
   b) $\Delta g_{mix} = -11.6 \frac{kJ}{mol}$
   c) $\Delta g_{mix} = -30.2 \frac{kJ}{mol}$
   d) None of the above

4. A binary liquid mixture containing 15% A and 85% B is in equilibrium with the vapor mixture containing 20% A and 80% B at a pressure $P = 2$ bars. If $f_A^l = 1$ bar with an activity coefficient $\gamma_A = 1.6$, then the fugacity coefficient of A in the vapor is given by

   a) $\hat{\varphi}_A = 0.3$
   b) $\hat{\varphi}_A = 0.6$
   c) $\hat{\varphi}_A = 1.2$
   d) None of the above

5. For a binary mixture at $T = 400K$ and $P = 1.5$ bar, the activity coefficient γ_A at infinite dilution, i.e. near $x_B = 1$, was found to be 1.5. Assuming that the Margules 2-suffix model, $g^E = A\, x_A x_B$ is appropriate for the solution, then we have

   a) $\frac{A}{R} = 142\ K$
   b) $\frac{A}{R} = 212\ K$
   c) $\frac{A}{R} = 420\ K$
   d) None of the above

6. From the generalized correlation, the following values were found for pure A: $\ln\left(\phi^{(0)}\right) = -0.3$, $\ln\left(\phi^{(1)}\right) = 0.1$ and $\omega = 0.2$ for substance A at $P = 200$ bars. Then the fugacity is given by

   a) $f_A = 122$ bars
   b) $f_A = 203$ bars
   c) $f_A = 151$ bars
   d) None of the above