CM3230
Fall 2010
Quiz 3a

Name _____

(Encircle the correct answers: 5 correct answers for 100 full points and additional bonus 20 pts for all 6 correct answers.)

1. The equation for $\left(\frac{\partial T}{\partial P}\right)_v$ under the van der Waals equation of state given by

$$P = \frac{RT}{v-b} - \frac{a}{v^2}$$

   a. $\left(\frac{\partial T}{\partial P}\right)_v = \frac{R}{v-b}$
   b. $\left(\frac{\partial T}{\partial P}\right)_v = \frac{v-b}{R}$
   c. $\left(\frac{\partial T}{\partial P}\right)_v = -\frac{R}{(v-b)^2}$
   d. $\left(\frac{\partial T}{\partial P}\right)_v = -\frac{(v-b)^2}{R}$
   e. None of the above

2. Which of the following is the correct equality?
   a. $\left(\frac{\partial s}{\partial v}\right)_P \left(\frac{\partial v}{\partial P}\right)_s = \left(\frac{\partial s}{\partial P}\right)_v$
   b. $\left(\frac{\partial v}{\partial P}\right)_s = -\left(\frac{\partial s}{\partial P}\right)_v \left(\frac{\partial s}{\partial v}\right)_P$
   c. $\left(\frac{\partial v}{\partial P}\right)_s \left(\frac{\partial P}{\partial s}\right)_v \left(\frac{\partial s}{\partial v}\right)_T = -1$
   d. $\left(\frac{\partial v}{\partial P}\right)_s \left(\frac{\partial P}{\partial s}\right)_v \left(\frac{\partial s}{\partial v}\right)_P = 1$
   e. None of the above

3. The differential of $(u-g)$ is given by
   a. $d(u-g) = d(Ts) + d(vP)$
   b. $d(u-g) = -sdT + vdP$
   c. $d(u-g) = -d(Pv) + Tds$
   d. $d(u-g) = d(Ts) - d(Pv)$
   e. None of the above

4. Using a virial equation of state given by: $\frac{Pv}{RT} = 1 + B'P,$ the term $\left(\frac{\partial h}{\partial P}\right)_T$ will be given by
   a. $\left(\frac{\partial h}{\partial P}\right)_T = 2v$
   b. $\left(\frac{\partial h}{\partial P}\right)_T = \frac{v}{RT}(1 + B'P)$
   c. $\left(\frac{\partial h}{\partial P}\right)_T = 0$
   d. $\left(\frac{\partial h}{\partial P}\right)_T = \frac{R}{P}(1 + B'P)$
   e. None of the above

5. The missing term x in the following equation

$$\frac{\left(\frac{\partial T}{\partial P}\right)_s}{\left(\frac{\partial s}{\partial P}\right)_T} = \frac{x}{T}$$

   has to be:
   a. $x = c_P$
   b. $x = \frac{T}{c_P}$
   c. $x = 1 + \frac{1}{c_P}$
   d. $x = \frac{T^2}{c_P}$
   e. None of the above

6. The product $\left(\frac{\partial T}{\partial v}\right)_s \left(\frac{\partial P}{\partial T}\right)_s \left(\frac{\partial v}{\partial P}\right)_T = y$ is given by:
   a. $y = -1$
   b. $y = \frac{c_P}{c_v}$
   c. $y = 0$
   d. $y = \frac{c_P}{T}$
   e. None of the above