Answers:

1.

1). b

2). c

3). b

4). d

2.

a). $[C_V\,(¶V/¶P)_T\; - \mathrm{V}\,(¶V/¶T)_P\;]/C_P$

b). for ideal gas, $PV = RT$

$(¶V/¶P)_T\; = -V/P$; $(¶V/¶T)_P = R/P$

Bring the derivatives to equation developed in a) will prove that

$(¶V/¶P)_H = -V/P$ for ideal gas.

3.

a). $(¶T/¶P)_H = [T(¶V/¶T)_P\; - \mathrm{V}]/C_P$

b). take van der Waals equation as $(P + a/V^2)\,(V\text{-}b) = RT$,

$(¶V/¶T)_P\; = RV^3/(PV^3 - aV + 2ab)$ and bring this to the equation obtained in a).

4. a). $T_r = 1.06$, $P_r = 0.1$, $\ln j^{\,0} = -0.02$, $\ln j^{\,1} = 0$, $j = 0.98$, $f = j\,P = 0.78$ MPa

b). $\ln j = BP/RT = -0.03$, $j = 0.97$, $f = j\,P = 0.776$ MPa