Stewart 9e. 14.3.85

$$\left(P + \frac{n^2a}{V^2}\right)(V-nb) = nRT$$

notice $\rightarrow P + \frac{n^2a}{V^2} = \frac{nRT}{V-nb}$ slightly simpler

$\frac{\partial}{\partial P}\Big|_V$:

$$(1+0)(V-nb) = nR\frac{\partial T}{\partial P}$$

$$\frac{\partial T}{\partial P} = \boxed{\frac{V-nb}{nR}}$$

$\frac{\partial}{\partial V}\Big|_T$:

$$\left(\frac{\partial P}{\partial V} - \frac{2n^2a}{V^3}\right)(V-nb) + \left(P + \frac{n^2a}{V^2}\right)1 = 0$$

$$\frac{\partial P}{\partial V} - \frac{2n^2a}{V^3} = -\frac{\left(P + \frac{n^2a}{V^2}\right)}{V-nb}$$

$$\frac{\partial P}{\partial V} = \frac{2n^2a}{V^3} - \frac{\left(P + \frac{n^2a}{V^2}\right)}{V-nb}$$

substitute since this assumed that this condition holds for this problem

$$= \boxed{\frac{2n^2a}{V^3} - \frac{nRT}{(V-nb)^2}}$$