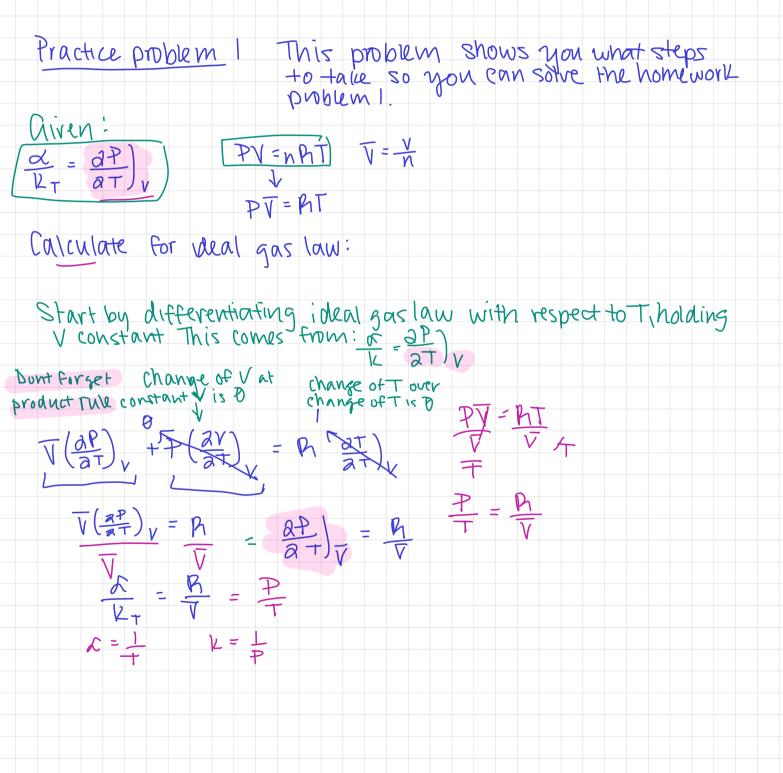
Example For Problem!

Derive an expression for $\frac{\alpha}{12+}$ where $\alpha = \frac{1}{\sqrt{\alpha+\beta}} \left(\frac{a\sqrt{\alpha}}{a+\beta} \right) p$

Link to complicated problem

https://chem.libretexts.org/Bookshelves/ Physical_and_Theoretical_Chemistry_Textbook_Maps/Physical_Chemistry_(Fleming)/ 04%3A_Putting_the_First_Law_to_Work/4.03%3A_Compressibility_and_Expansivity

 $V_{r} = -\frac{1}{\nabla} \left(\frac{a \nabla}{BP} \right)_{T}$



Differentiate with respect to T, at constant P, be Cp is constant P, and you have to add T Probum 2 into the mix H = V + PV $C_{p} = \left(\frac{AH}{AT}\right)_{p}$ show $(C_{P} = \frac{AU}{AT})_{P} + P \frac{\partial V}{AT})_{D}$ $\frac{\partial H}{\partial T} = \frac{\partial U}{\partial T} + \frac{\partial F}{\partial T} + P(\frac{\partial V}{\partial T})$ b) $C_{V} = \left(\frac{\partial M}{\partial T}\right) V$ using "non-natural derivative" show: $W = U(T, V) \qquad C_{P} - C_{V} = \left(\frac{a W}{a V}\right)_{T} \left(\frac{a V}{a T}\right) + P\left(\frac{a V}{a T}\right)_{P}$ Differentiate with respect to T, at constant P, be Cp is constant P, and you have to add T into the mix. Why? to get Cv in terms of Cp $\frac{dU}{dT} = \left(\frac{aU}{aT}\right)_{V} \frac{dT}{dT} + \frac{aU}{aV} + \frac{dV}{dT}_{P} C_{P} = \frac{2U}{aT} + \frac{PaV}{aT}_{P}$ +P = +P = +P = +), Plug in and cancel stuff at this point $C_{P} - C_{V} = \begin{bmatrix} dW \\ dT \end{bmatrix} + P = \begin{pmatrix} P = V \\ aT \end{pmatrix} + \begin{bmatrix} aW \\ aT \end{bmatrix} + \begin{bmatrix} aW$ $C_{p} - C_{v} = \frac{2U}{aT} + \frac{2U}{v} + \frac{2U}{aV} + \frac{4U}{dT} + \frac{4U}{dT} + \frac{2U}{aT} - \frac{2U}{aT}$