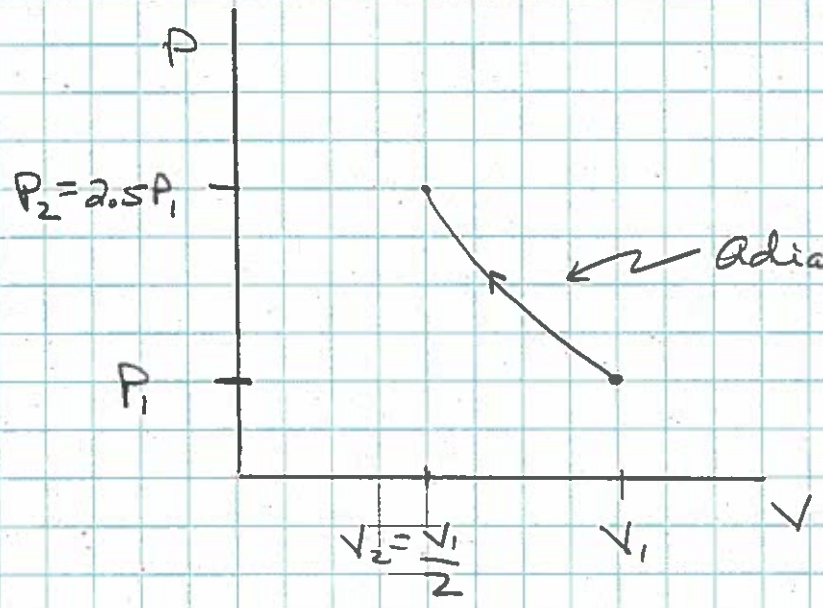

a.) for adiabatic: $PV^{\gamma} = \text{const.}$

So $P_1 V_1^{\gamma} = P_2 V_2^{\gamma}$

$$\frac{P_1}{P_2} = \left(\frac{V_2}{V_1}\right)^{\gamma}$$

$$\log\left(\frac{P_1}{P_2}\right) = \log\left(\frac{V_2}{V_1}\right)^{\gamma} = \gamma \ln\left(\frac{V_2}{V_1}\right)$$

$$\therefore \quad \gamma = \frac{\ln(P_1/P_2)}{\ln(V_2/V_1)} = \frac{\ln(1/2.5)}{\ln(1/2)} = \underline{1.32}$$

b.) Also for adiabatic: $TV^{\gamma-1} = \text{const.}$

So: $T_1 V_1^{\gamma-1} = T_2 V_2^{\gamma-1}$

$$\frac{T_2}{T_1} = \left(\frac{V_1}{V_2}\right)^{\gamma-1} = (2)^{.32} = \underline{1.248}$$