

[tex27] Heat capacities of the van der Waals gas

Consider the van der Waals equation of state for $n = 1$ mol of a gas:

$$\left(p + \frac{a}{V^2}\right)(V - b) = RT.$$

- (a) Show that the heat capacity C_V may depend on T but is independent of V .
- (b) Calculate the quantity $C_p - C_V$ as a function of p and V . Verify that $C_p - C_V \rightarrow R$ in the ideal gas limit.

Solution: