EXAMPLE 3.6

$$C_V(T) := 27.841 - 0.511 \cdot 10^{-1} T + 2.215 \cdot 10^{-4} T^2 - 1.824 \cdot 10^{-7} T^3 + 4.899 \cdot 10^{-11} T^4$$

$R := 8.314 \cdot 10^{-5}$ $T_c := 190.6$ $P_c := 46.1$

$V_1 := 3 \cdot 10^{-4}$ $V_2 := 6 \cdot 10^{-4}$ $n := 10$

Initial guess value

$T := 500$

Given

$$n \cdot \left(\frac{27}{64} \cdot \frac{R^2 \cdot T_c^{\,2}}{P_c} \right) \left(\frac{1}{V_1} - \frac{1}{V_2} \right) \cdot \frac{1}{10^{-5}} + \int_{500}^{T} C_V(T)\, dT = 0$$

$\text{Find}(T) = 390.105$

Alternative Approach

$T := 300$

$$f(T) := n \cdot \left(\frac{27}{64} \cdot \frac{R^2 \cdot T_c^{\,2}}{P_c} \right) \left(\frac{1}{V_1} - \frac{1}{V_2} \right) \cdot \frac{1}{10^{-5}} + \int_{500}^{T} C_V(T)\, dT$$

$\text{root}(f(T), T) = 390.105$