Problem T3. (Unified Thermodynamics)

Consider two quasi-static expansion processes, one adiabatic, the second isothermal for a closed system containing air at $T_1 = 300$ K, $v_1 = 1$ m$^3$/kg. At the end of both expansion processes, the specific volume, $v_2 = 10$ m$^3$/kg. Assume that $c_p = 1.0035$ kJ/kg-K, $c_v = 0.7165$ kJ/kg-K, and $R = 0.287$ kJ/kg-K.

a) Sketch both processes on p-v and T-v diagrams.

b) For each process determine $p_2$ and $T_2$.

c) For each process, determine the work done by the system and the heat transferred to the system.

d) For each process calculate the change in enthalpy of the air.

e) What is the difference between heat and temperature?

(LO#4, LO#5)