

Problem T5. (Unified Thermodynamics)

a) Draw a thermodynamic cycle on p-v and T- v diagrams consisting of

- Leg 1-2: adiabatic expansion
- Leg 2-3: constant volume heat addition
- Leg 3-4: constant pressure expansion
- Leg 4-1: isothermal compression

Assume that all processes are quasi-static and involve an ideal gas. On the p-v diagram, include lines of constant temperature in the background. On the T-v diagram, include lines of constant pressure in the background.

- b) For each leg, determine if the heat and work transfers are (+), (-), or zero.
- c) Is the net work for this cycle positive or negative?
- d) What common purpose might you use a cycle like this for and why?

(LO#3, LO#4, LO#5, LO#6)