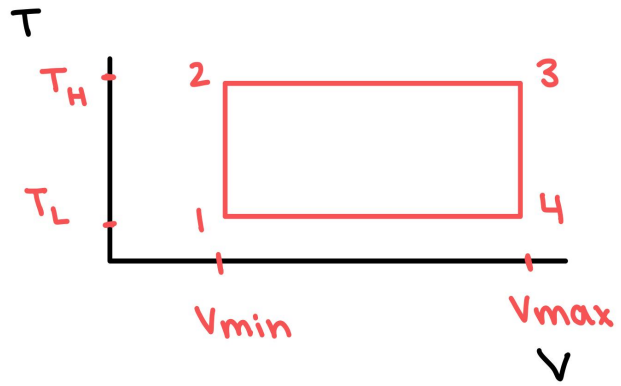
Ideal Efficiency Derivation

Helpful Hints

Begin with the T-V Diagram for an Ideal Cycle



- Label all work/heat interactions
- Plug into 1 / η = Qin / Wnet
  - ENSURE you keep it in terms of 1/η to help math later on
- Four important terms
  - Q12
  - W23 (work output)
  - W14 (work input)
  - Q23 (W23=Q23 -> in order to remain at T_H heat entering system must equal work leaving system)

Helpful Hints when Solving For Terms

- Q12
  - Must be in terms of R rather than Cv or Cp
  - For ideal gas: Cp = 1.4Cv
- W23 & W14
  - $W = \int PdV$
  - Helpful relation: PV = mRT
  - Should result in natural logs -> utilize natural log rules for simplification
- Final result should be in terms of $\eta = [\quad]^{-1}$