Ideal Cycles,
Air-Standard Assumptions,

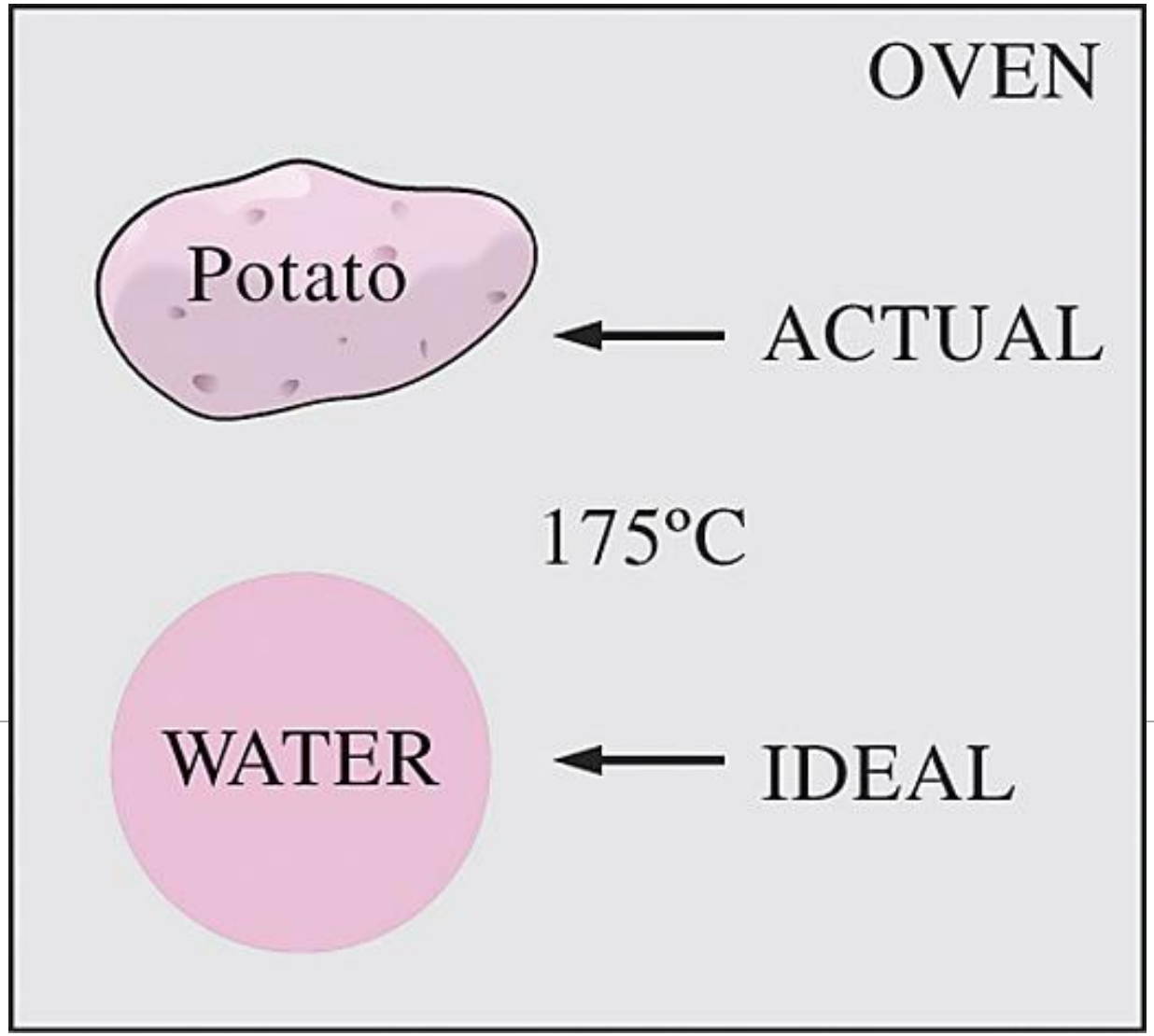
Dr.R.Sudhakaran
Vice Principal

Thermodynamic Cycles

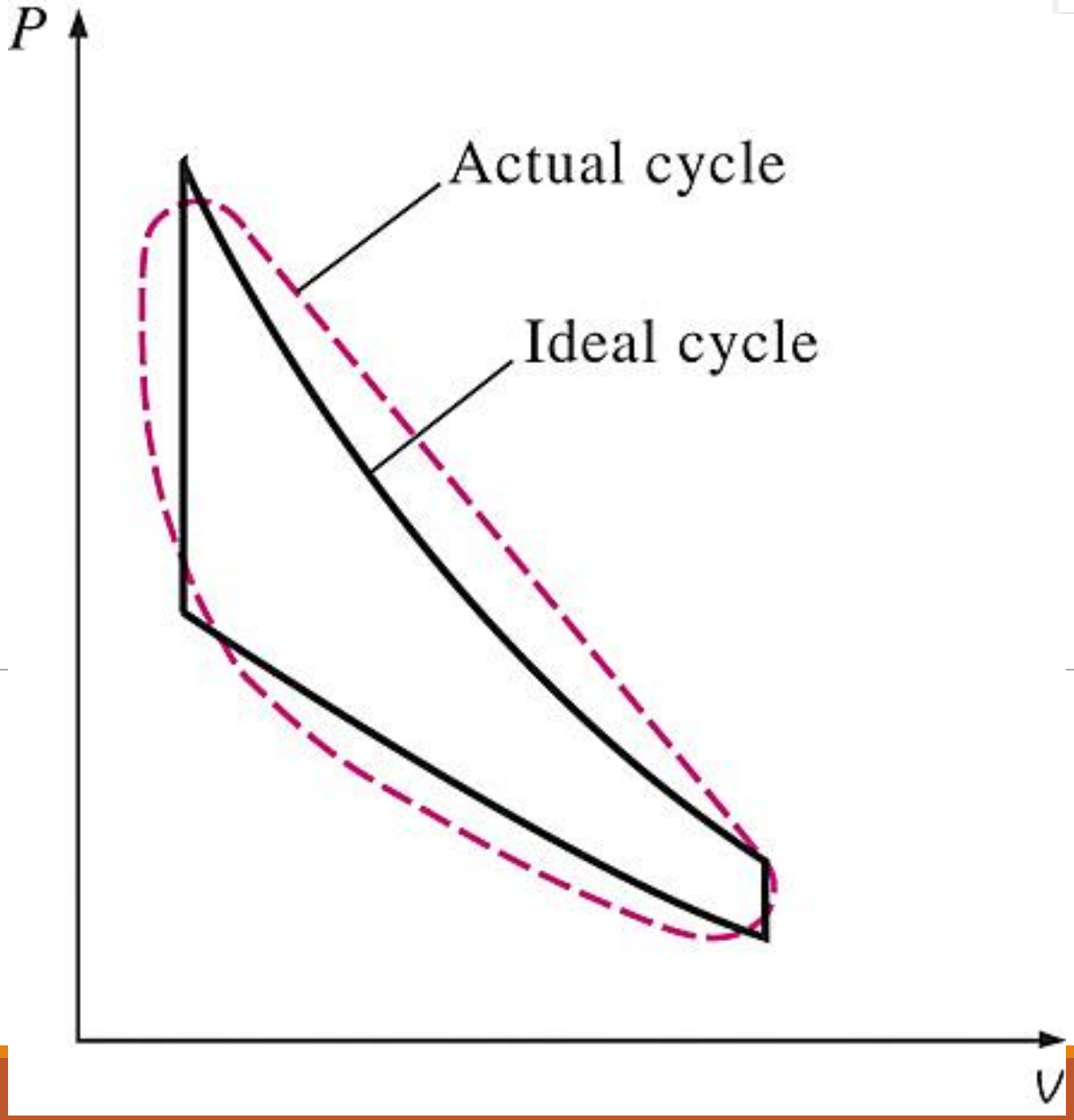
Power Cycles vs Refrigeration Cycles

Power Cycles

- Gas vs vapor
- Closed vs Open
- Internal Combustion vs External Combustion



Ideal cycles are simplified



Be careful how you interpret results from ideal cycles

Ideal Cycles

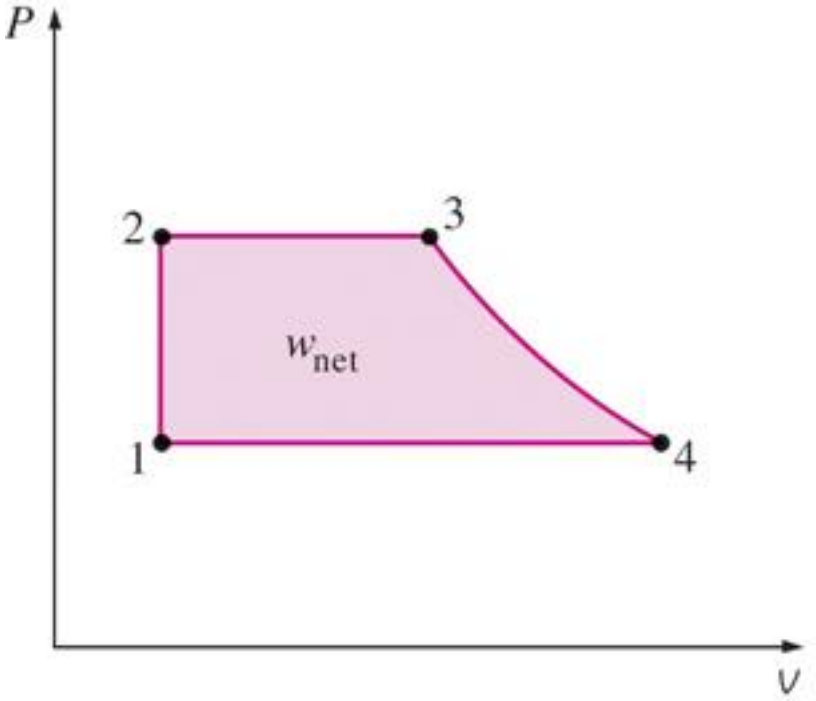
More realistic than Carnot cycle.

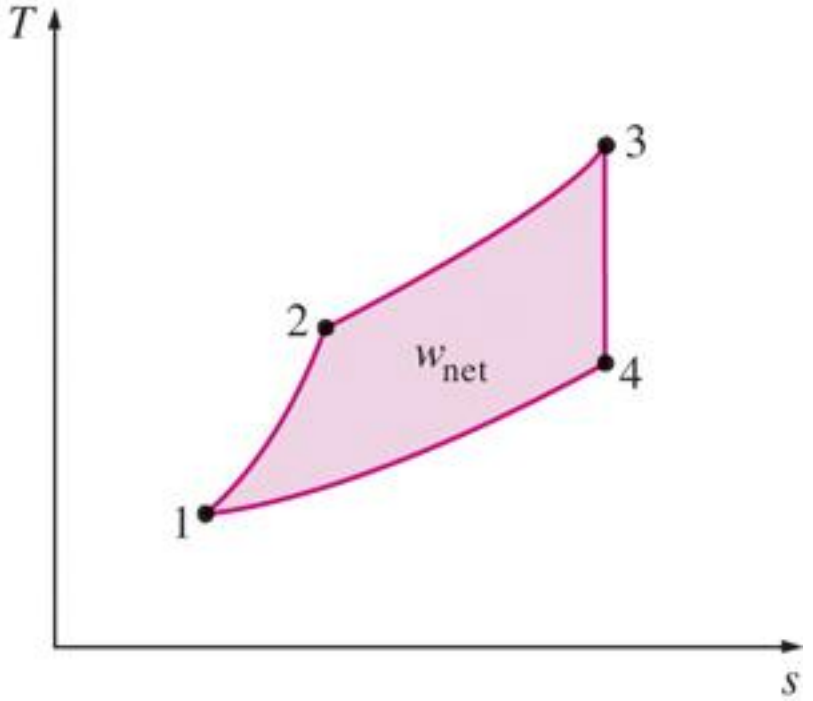
Internally reversible but not totally.

Idealizations:

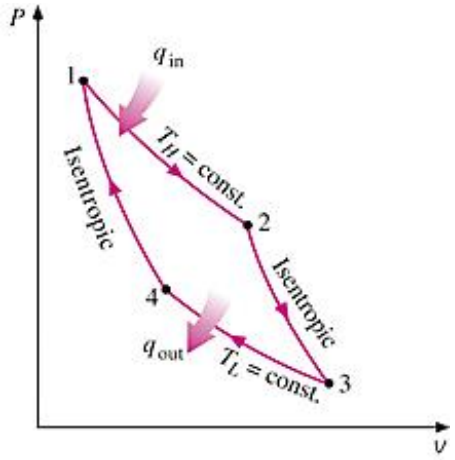
- No friction
- Expansions and compressions – quasi-equilibrium
- Heat transfer is negligible

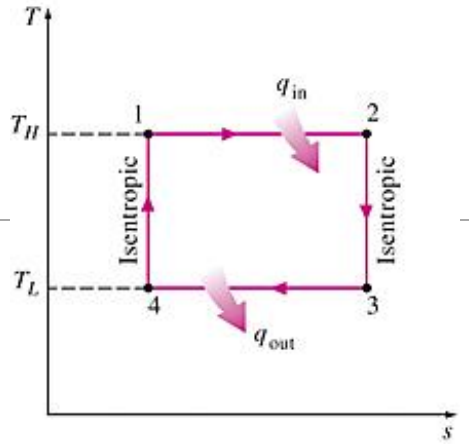
rea inside the cycle represents net work out for Ts or Pv diagrams.



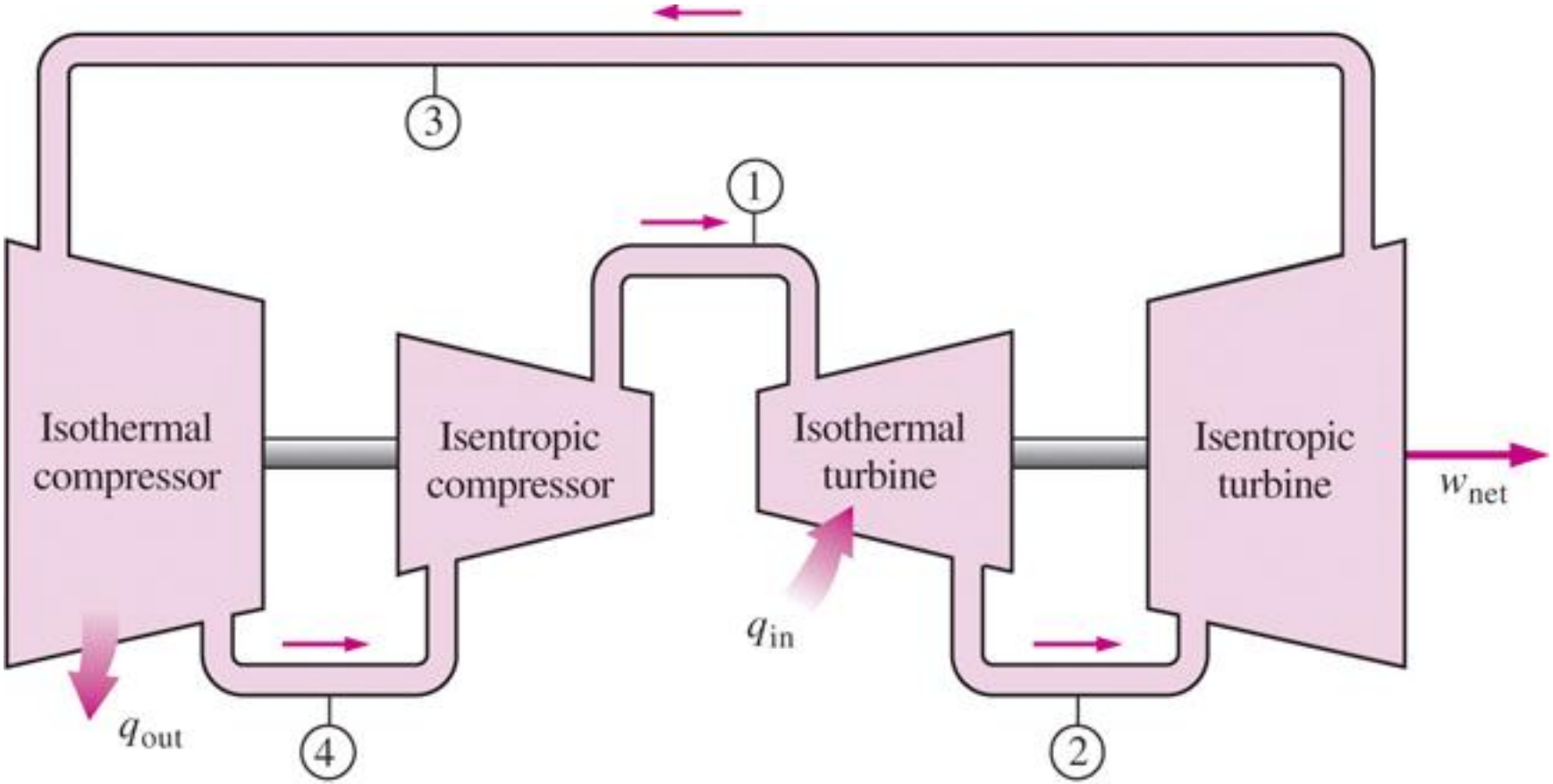


Diagrams for a Carnot Cycle

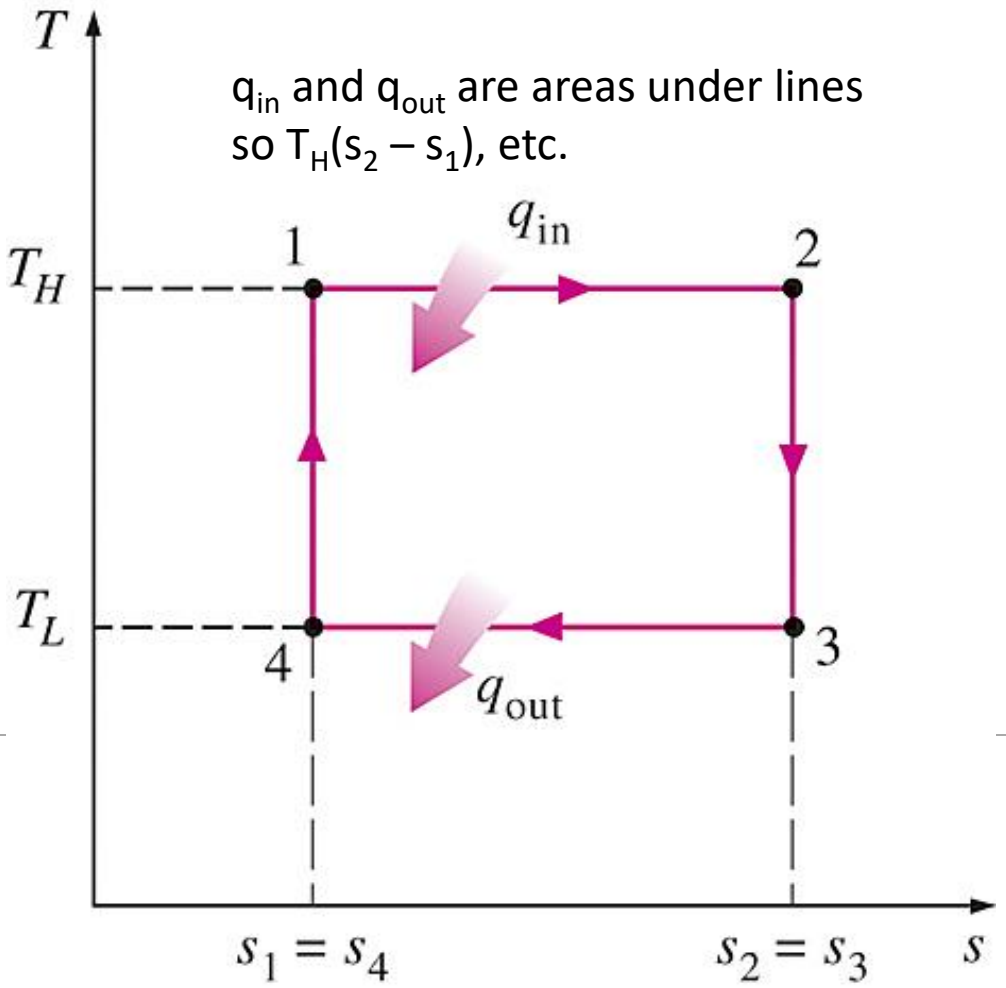




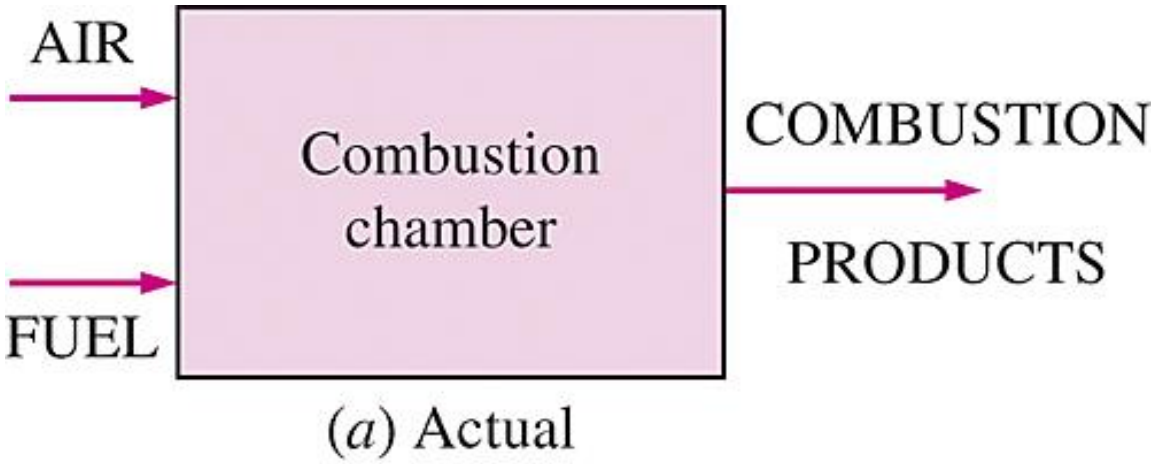
quipment for a Carnot cycle. Changes have to be slow, with very large heat exchangers, so not practical.



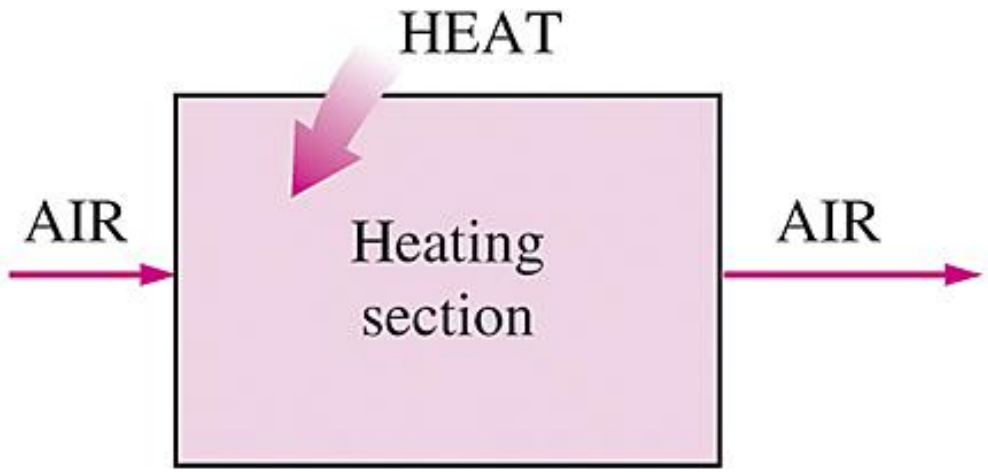
Proof of thermal efficiency of a Carnot cycle



Air Standard Assumptions



(*a*) Actual



(*b*) Ideal

Air Standard Assumptions

Air in closed loop – ideal gas

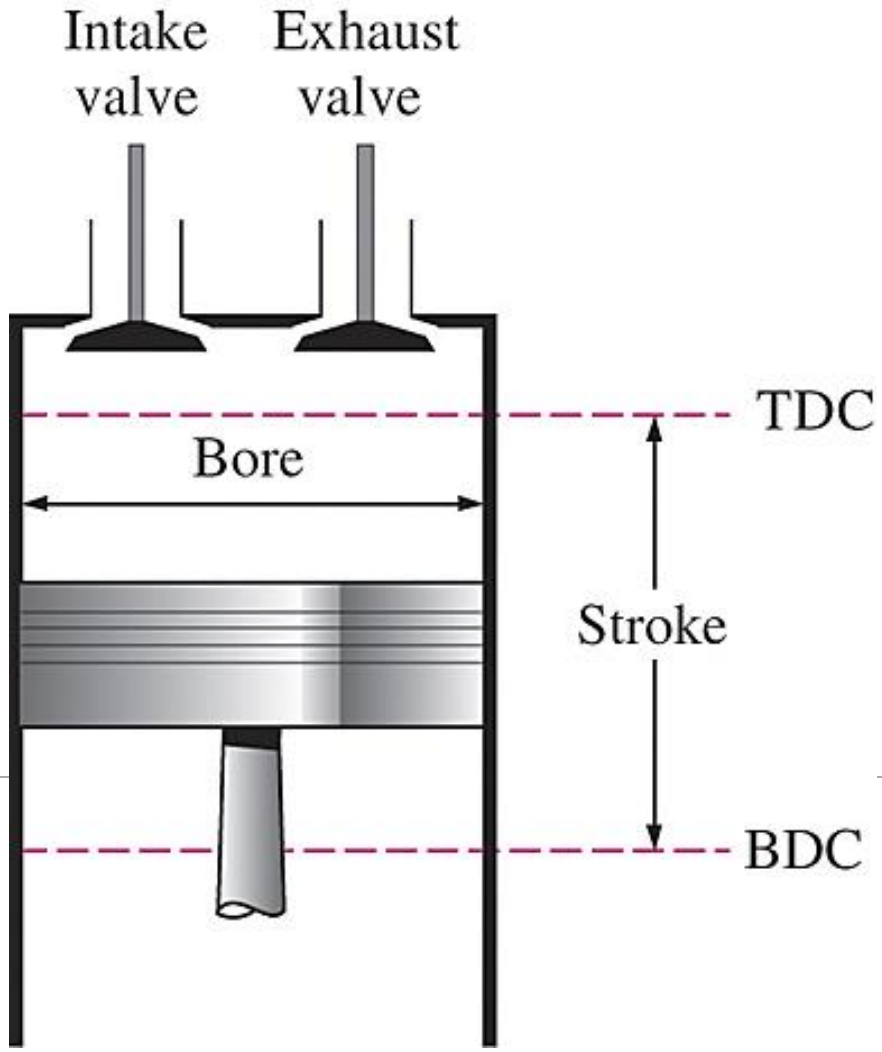
Internally reversible

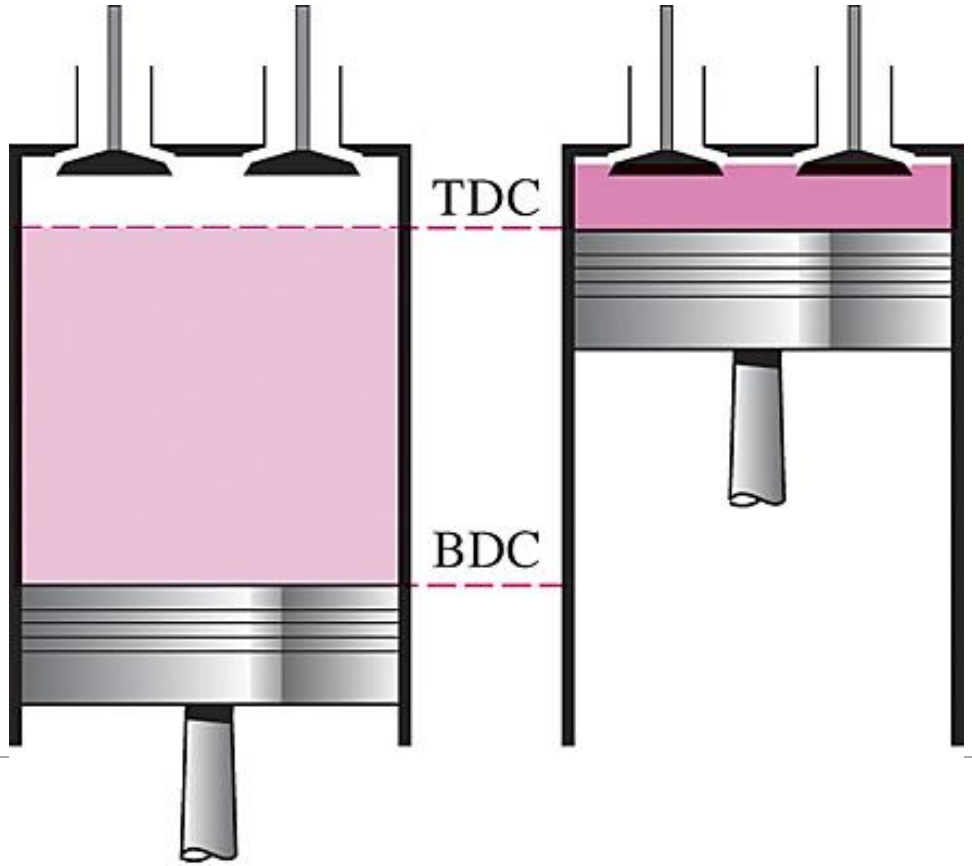
Combustion replaced by heat addition

Exhaust replaced by heat rejection

Properties at room temp. – cold air standard assumptions.

Nomenclature





(*a*) Displacement volume

(*b*) Clearance volume