**4.3) Carnot Cycles**

Four internally reversible cycles

$$\left(\frac{Q_C}{Q_H}\right)_{\substack{rev\\cycle}} = \frac{T_C}{T_H}$$

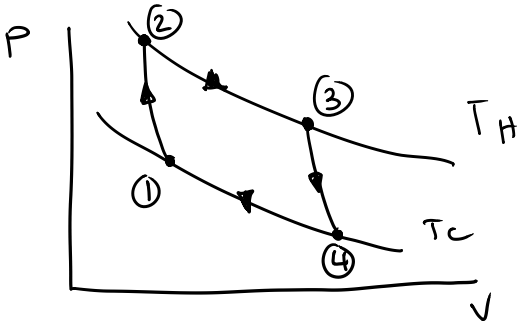
Carnot Gas Power Cycle

Process 1-2: Gas is compressed adiabatically (No Heat Transfer) increasing to $T_H$

Process 2-3: Isothermal (constant temperature) expansion

Process 3-4: Adiabatic expansion to $T_C$

Process 4-1: Isothermal compression to the initial state



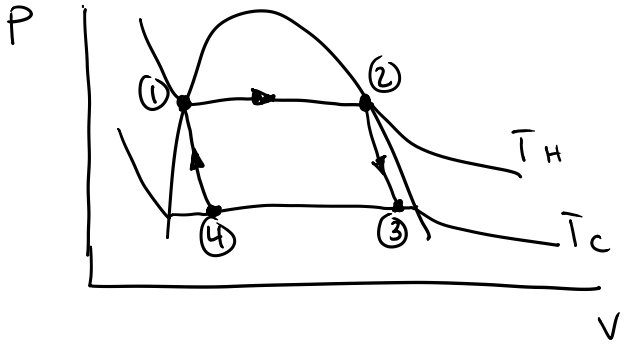

Carnot Vapor Power Cycle

Process 1-2: Isothermal and constant pressure evaporation from saturated liquid to saturated vapor (Boiler)

Process 2-3: Adiabatic Expansion from saturated vapor to $T_C$ (Turbine)

Process 3-4: Isothermal and constant pressure condensation (Condenser)

Process 4-1: Adiabatic compression to saturated liquid to $T_H$ (Pump)



Carnot Gas Refrigeration and Heat Pump Cycles

Process 1-2: Isothermal expansion at $T_C$

Process 2-3: Adiabatic compression to $T_H$

Process 3-4: Isothermal Compression at $T_H$

Process 4-1: Adiabatic Expansion to $T_C$