Why is Thermodynamics difficult?
- 300 yr old steam engine
- Kinetic theory & Assumptions
- Statistical Mechanics, QM, Partition function $Q, Z$

Generality $E, S, f, d, e, \varepsilon$

Specific: gases, ideal gases

$dtw = \int_0^\infty p \, dv$

$T \, dx$

$\sigma \, dA$

$B \, dM$

Energy $U$

Entropy $S$

Enthalpy $H$

Helmholtz free energy

$A, F$

Timeline for laws of Thermodynamics

- 1824
- 1850
- 1871
- 1906

2nd Law

1st Law

0th Law

3rd Law