

Maxwell Relations

Internal Energy

$$dU = T dS - P dV \qquad \left(\frac{\partial T}{\partial V}\right)_S = - \left(\frac{\partial P}{\partial S}\right)_V$$

Enthalpy

$$dH = T dS + V dP \qquad \left(\frac{\partial T}{\partial P}\right)_S = \left(\frac{\partial V}{\partial S}\right)_P$$

Helmholtz Free Energy

$$dA = -S dT - P dV \qquad \left(\frac{\partial S}{\partial V}\right)_T = \left(\frac{\partial P}{\partial T}\right)_V$$

Gibbs Free Energy

$$dG = -S dT + V dP \qquad - \left(\frac{\partial S}{\partial P}\right)_T = \left(\frac{\partial V}{\partial T}\right)_P$$