

Some potentially useful formulas:

$$H = U + PV$$

$$F = U - ST$$

$$G = U + PV - ST$$

$$dU = T dS - P dV + \mu dN$$

$$dH = T dS + V dP + \mu dN$$

$$dF = -S dT - P dV + \mu dN$$

$$dG = -S dT + V dP + \mu dN$$

$$\frac{\partial P}{\partial T} = \frac{L}{T\Delta V}$$

$$\text{prob}(s) \sim \exp\left(-\frac{E(s)}{kT}\right)$$

$$\text{prob}(E) \sim \Omega(E) \exp\left(-\frac{E}{kT}\right)$$

$$\beta \equiv \frac{1}{kT}$$

$$Z(T) = \sum_{\text{all states } s} e^{-\beta E(s)} = \sum_{\text{all energies } E} \Omega(E) e^{-\beta E}$$

$$P(s) = \frac{1}{Z} e^{-\beta E(s)}$$

$$\bar{X} = \sum_s X(s) P(s)$$