

Formulae for Exam #2

$$C_V = T \left(\frac{\partial S}{\partial T} \right)_{V,N} \quad C_p = T \left(\frac{\partial S}{\partial T} \right)_{p,N} \quad C_V = \left(\frac{\partial U}{\partial T} \right)_{V,N}$$

$$dU = TdS - pdV + \mu dN$$

$$H = U + pV \quad F = U - TS \quad G = U - TS + pV$$

$$S = k \ln \Omega$$

$$pV = NkT \quad U = \frac{f}{2} NkT \quad V^\gamma p = \text{const.}, \text{ where } \gamma = (f + 2)/f$$

$$p = \frac{NkT}{(V-bN)} - a \frac{N^2}{V^2}$$

$$\epsilon = \frac{W}{Q_h} \quad \text{COP} = \frac{Q_c}{W}$$

$$G = \mu N$$

$$\frac{dp}{dT} = \frac{\Delta S}{\Delta V} = \frac{L}{T \Delta V}$$

$$\tanh(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}} \quad \frac{d \tanh(x)}{dx} = \frac{1}{\cosh^2(x)}$$

$$N \ln N! \approx N \ln N - N$$