

- $$A = E - TS$$

- $$G = A + PV = E - TS + PV = \mu N$$

- $$H = E + PV = G + TS$$

- $$C_V \equiv T \left(\frac{\partial S}{\partial T} \right)_{N,V} = \left(\frac{\partial E}{\partial T} \right)_{N,V}$$

- $$C_P \equiv T \left(\frac{\partial S}{\partial T} \right)_{N,P} = \left(\frac{\partial(E + PV)}{\partial T} \right)_{N,P} = \left(\frac{\partial H}{\partial T} \right)_{N,P}$$