[tex20] Thermodynamics of an ideal paramagnet II

Consider an ideal paramagnet specified by the equation of state $M = H/T$ (Curie law) and heat capacity $C_M = \text{const}$.
(a) Find the internal energy $U(T, H)$, the entropy $S(T, H)$, and the enthalpy $E(T, H)$.
(b) Infer the Helmholtz free energy $A(T, M)$, and the Gibbs free energy $G(T, H)$.
(c) Determine the response functions $\chi_T(T)$, $C_H(M)$, $\chi_S(T, M)$, and $\alpha_H(T, H)$.

Solution: