

1 Free energy of a two state system

- (a) Find an expression for the free energy as a function of T of a system with two states, one at energy 0 and one at energy ε .
- (b) From the free energy, find expressions for the internal energy U and entropy S of the system.
- (c) Plot the entropy versus T . Explain its asymptotic behavior as the temperature becomes high.
- (d) Plot the $S(T)$ versus $U(T)$. Explain the maximum value of the energy U .