



**MathsNET**

A joined up approach to  
teaching and learning  
mathematics

# Entropy in statistical mechanics

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- How are the entropy and the information related
- Fill in the blank in the following sentence: The uniform distribution has ... entropy.
- Give an expression for the entropy if the distribution is uniform and define all terms.
- Give an expression for  $\log P_j$  given that  $P_j = \frac{e^{-\sum_k \lambda_k B_j^{(k)}}}{e^\Phi}$ .



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- Hence, show that:  $S = k_B \sum_i P_i \sum_k \lambda_k B_i^{(k)} + k_B \sum_i P_i \Psi$  to do this you will need to note how entropy,  $S$ , and information are related and to remember the formula that gives you the information contained in a distribution.

- What is  $\sum_i P_i$  equal to

- What is  $\sum_i P_i B_i^{(k)}$  equal to

- Give an expression for the entropy for a generalised distribution and explain how the results above are used in the derivation of this result.