$$P(E_i) = \frac{f(E_i)}{\sum_j f(E_j)} =$$

$$= \frac{f(E_i+C)}{\sum_j f(E_j+C)} \qquad g =$$

$$\frac{f(E)}{Z(0)} = \frac{f(E+C)}{Z(C)}$$

$$f(C) = \frac{f(E+C)}{f(E)}$$

$$\frac{f(E_j)}{f(E_i)} = \frac{f(E_j+C)}{f(E_i+C)}$$

$$f(E)f(C) = \\ = f(E+C)$$

$$\frac{f(E_i+C)}{f(E_i)} = \frac{f(E_j+C)}{f(E_j)} =$$

$$0 = g(0)$$

$$g(A) = \log(f(A))$$

$$g(E) + g(C) = g(E+C)$$

$$P(E) = \frac{f(E)}{Z}$$

$$Z = \int_{-\infty}^{+\infty} f(k)\,\Omega(k)\,dk$$

$$\Omega^*(k+c) = \Omega(k) \qquad P^*(k+c) = P(k)$$

$$P^*(E+c) = \frac{f(E+c)}{Z^*} = P(E)$$

$$\frac{Z^*(c)}{Z} = \frac{f(E_1+c)}{f(E_1)} = k(c) = \frac{f(E_2+c)}{f(E_2)}$$

$$f(0) \overset{!}{=} 1 \qquad c = -E_1: \ \frac{f(E_2)}{f(E_1)} = f(E_2-E_1)$$

$$g(x) = \log(f(x))$$

$$g(E_2) - g(E_1) = g(E_2-E_1)$$

$$c = -E_2: \ g(E_1) - g(E_2) = g(E_1-E_2)$$

$$\Rightarrow \boxed{g(x) = -g(-x)}$$

$$g(E_2) + g(-E_1) = g(E_2-E_1) \qquad E_1 \Rightarrow -E_1: \ g(E_1) + g(E_2) = g(E_1+E_2)$$

$$g(E) = g(n n^{-1} E) =$$

$$= n\, g(n^{-1} E)$$

$$\boxed{g(nE) = n\, g(E)}$$

$$\rightsquigarrow g(n^{-1} E) = n^{-1} g(E)$$

$$\Rightarrow g(kE) = \qquad k \in \mathbb{Q}$$

$$= k\, g(E)$$