

$$S(N, E) = N K_B \ln \left(\frac{E}{N \hbar \omega} + 1 \right)$$

$$K_B \left[N \ln \left(\frac{N+R}{N} \right) + R \ln \left(\frac{N+R}{R} \right) \right]$$

$$\frac{E}{N} = K_B T$$

$$\frac{1}{2} \hbar \omega \frac{e^{\frac{\hbar \omega}{K_B T}} + 1}{e^{\frac{\hbar \omega}{K_B T}} - 1}$$

$$\frac{(R+N-1)!}{R! (N-1)!} \approx \frac{R^N}{N!}$$

$$R \gg N$$

$$R \approx \frac{E}{\hbar \omega}$$