

## 1 Pressure of thermal radiation

(modified from K&K 4.6) We discussed in class that

$$p = - \left( \frac{\partial F}{\partial V} \right)_T \quad (1)$$

Use this relationship to show that

(a)

$$p = - \sum_j \langle n_j \rangle \hbar \left( \frac{d\omega_j}{dV} \right), \quad (2)$$

where  $\langle n_j \rangle$  is the number of photons in the mode  $j$ ;

(b) Solve for the relationship between pressure and internal energy.