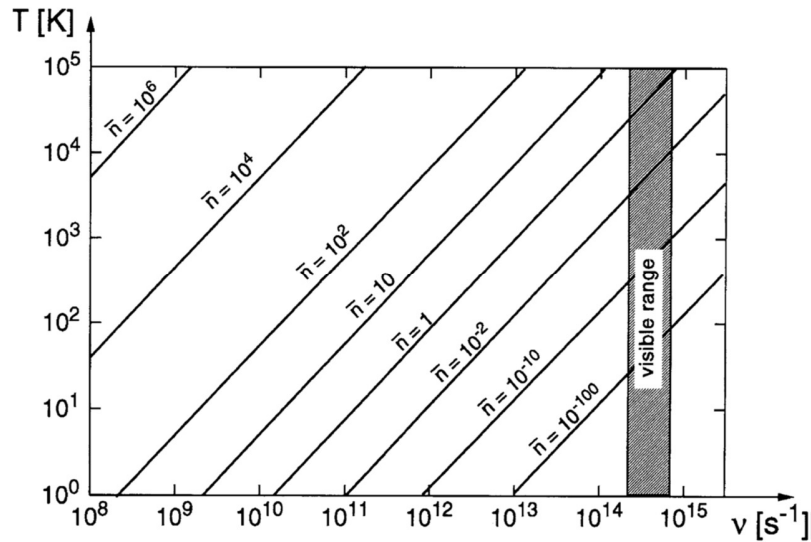


Q1.

Use Mathematica or another program to reproduce the following figure from your textbook. Find the mean number of photons per mode in thermal radiation field of power 100 W at room ( $T=300\text{K}$ ) and at  $\lambda = 500 \text{ nm}$ ). Show your work in details.



Q2.

In the semiclassical model, we treat the atom-field interaction part of the Hamiltonian as a perturbation. Compare this part with the unperturbed Hamiltonian of the free atom for the following situation: a 1 mW laser beam of 3 mm diameter in resonance with 1s to 1p transition of the hydrogen atom.