Phy 410
Quiz #5, Feb 27, 2009

The peak of the electromagnetic spectrum from a black body (#1) at temperature T_1=1000K is at a frequency ω_1. The peak of the spectrum from a second black body (#2) is at $2\omega_1$.

i)   What is the temperature of the second black body?

T_2=2000K
(Peak frequency scales linearly with temperature)

ii)   What is e_2/e_1 where e_i's correspond to the energy densities $(U/V)_i$?

$$\left(\frac{e_2}{e_1}\right) = \left(\frac{\tau_2}{\tau_1}\right)^4 = \left(\frac{T_2}{T_1}\right)^4 = \left(\frac{2000K}{1000K}\right)^4 = 2^4 = 16$$