Name: 1C Discussion- Week 6

1. **Radiation Pressure** *(YF 12th ed. 32.55).* — Interplanetary space contains dust. Radiation pressure from the sun sets a lower limit on the size of such dust particles.
(a) Write down F_G on a particle of mass m a distance r from the sun (mass $M_\odot$).
(b) Let L be the luminosity of the sun, i.e. the rate at which it emits energy. Find the force exerted on the totally absorbing particle.
(c) The mass density of a typical interplanetary dust particle is about $3000 kg/m^3$ and the luminosity is $L = 3.9 \times 10^{26} W$. Find the particle radius R such that the gravitational and radiation forces acting on the particle are equal in magnitude.

2. **Photon**. A 100W lightbulb emits light at an average frequency of $f_m = 1MHz$.
   (a) Calculate the number of photons per second passing through your pupil with radius $r = 0.5cm$ at a distance of $100m$.
   (b) How far would the lightbulb have to be for a flux of one photon per second?