**Homework 2**

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**4**

**4.a**

**Planck function:**

**4.b**

make , we have

solve this equation and we can get:

**4.c**

, the wavelength of the black-body radiation peak flux, is inversely proportional to temperature.

**4.d**

We define L: luminosity of Sun,

D: distance between Earth and Sun

R:radius of Earth

Earth’s absorption term:

Earth’s emission term:

Because we regard Earth as a blackbody, then we have:

we use and get

**5**

**5.a**

**5.b**

=0

if we take *:*

**5.c**

For ideal gas:

for pure ionized H:

for pure ionized He:

**5.d**

so the virial theorem is satisfied.

**6**

1. ideal gas：lots of mass points without interactions and their collisions are perfectly elastic. The ideal gas follows the equation:
2. virial theorem: in a gravitational bound stable system, the relationship of average kinetic energy <T> and average potential energy <V> follows the equation:
3. blackbody: an ideal object that can absorb radiation completely at every wavelength.
4. energy transport by convection: energy transport from high temperature region to low temperature region because of the temperature gradient.
5. Kelvin-Helmholz timescale: It’s a theoretical estimate of how long a [star](https://everything2.com/title/star) would shine with current [luminosity](https://everything2.com/title/luminosity) if the only power source were the conversion of [gravitational potential](https://everything2.com/title/gravity) energy.
6. HR diagram: It’s a 2-d figure with luminosity/magnitude versus effective temperature/color index, which can show different properties of different objects.
7. Jeans mass:  If the mass of a gaseous cloud exceeds the critical mass called Jeans mass, the cloud will collapse.
8. stellar effective temperature: the all-wavelength radiation emitted by a star equals the total energy emitted by a blackbody at a certain temperature called stellar effective temperature.
9. hydrostatic equilibrium: In this state, downward force exerted by [gravity](https://www.wisegeek.com/what-is-gravity.htm) of the fluid is balanced by an upward force exerted by the pressure.