ASTR 101, , Fall 2018, Homework #4

Due on Wednesday 11/14.

Please write your name clearly at the top the answer sheet and staple multiple sheets together.

Please give detailed answers and write legibly; if the grader can't read your answer, it will be considered wrong.

You can discuss the problems with anybody or get help. But answers should be in your own words, with a full understanding of the answer. No Cheating or copying.

1.

a. An object has a mass of 100 kg. What is the gravitational force by the Earth on it at the surface.

b. What would be the gravitational attractive force on it on the Moon.

c. What is the (a) weight (b) mass of it on the Earth and on the Moon?

Note: You may use the example given in the class (slide 13, 10/19) as a guide.

(radius of the Earth 6370 km, mass 5.97×10^{24} kg, radius of the Moon 1737 km, mass $7.35\ 10^{22}$ kg, gravitational constant $6.67 \times 10^{-11}\ m^3\ kg^{-1}\ s^{-2}$).

2)

a. How do rainbows form?
b. Why is the secondary rainbow dimmer than the primary rainbow?
c. Why are rainbows so frequently seen during summer and so seldom during *winter*?
d. Why is the rainbow usually visible in early morning or late afternoon but not around noon?

3) Why is the incandescent (filament) light bulb not an efficient source of light?

4) Normal human body temperature is about 37C.

a. What is the body temperature in Kelvins
b. At what wavelength the thermal radiation emitted by a person most intense? (use Wien's law).
c. In which region of the electromagnetic spectrum does that radiation occur?

5) Explain how the nebular hypothecs explain the following features of the solar system.
    a) All solar system objects orbit the sun in about the same plane
    b) There are two types of planets, terrestrial (earth like) and Jovian (Jupiter like)
    c) The asteroid belt in between Mars and Jupiter
    d) Jovian planets have a large number of Moons.
    e) Existence of comets.