Physics 313: Cosmology part
Homework 1
Instructor : Prof. M.Amarian
due Wednesday, April 15, 2009

1. Describe what are differences between spherical, hyperspherical and flat geometries in terms of K, sum of angles in a triangle and parallel lines. Write expression for the line element for all these three cases.

(20 points)

2. Show that in a condition p=-ρ density of the universe is constant.

(20 points)

3. Write down the values for deceleration parameter q_0 for non-relativistic matter, relativistic matter and vacuum, for the flat universe. What are relations between pressure and density in each case.

(20 points)

4. Show under which conditions Einstein and Friedmann equations lead to static universe.

(20 points)

5. The initial abundance ratio of uranium ^{238}U to thorium ^{232} has been estimated as $10^{-0.1}$. The observed abundance ratio of uranium to thorium in metal poor K giant star CS 22892-052 is $10^{-0.74\pm0.15}$. The decay rate of uranium is $0.15\cdot10^{-9}$ and of thorium - $0.03\cdot10^{-9}$. Estimate the age of this star.

(20 points)

Total: 100 points