**Phys 10 Homework 4 (Due Tuesday Feb 7)**

*Assigned: Feb 2  (Note, HW5 will be assigned Thurs Feb4 and be due Thurs Feb. 11)*

*This homework is shorter than the others to allow for the midterm this week This homework will carry ½ the weight of a normal homework in determining your total homework score.*

4.1 At “freeze out”, all available neutrons become bound with protons to form Helium nuclei (which contain 2 neutrons and 2 protons).

After freeze out, what would the proportion be of Hydrogen to Helium if the ratio of protons to neutrons was:

- a) 7/1
- b) 11/1
- c) 23/1

Please give the proportion of $H$ to $He$ by mass, as I have done in lecture.

*Note: This homework problem reflects a realistic situation in that modified theories are sometimes proposed that change the prediction for proton to neutron ratio. These theories need to be tested against know data about actual proportions of nuclei in the Universe to see if they are viable. Many otherwise interesting theories are ruled out this way.*