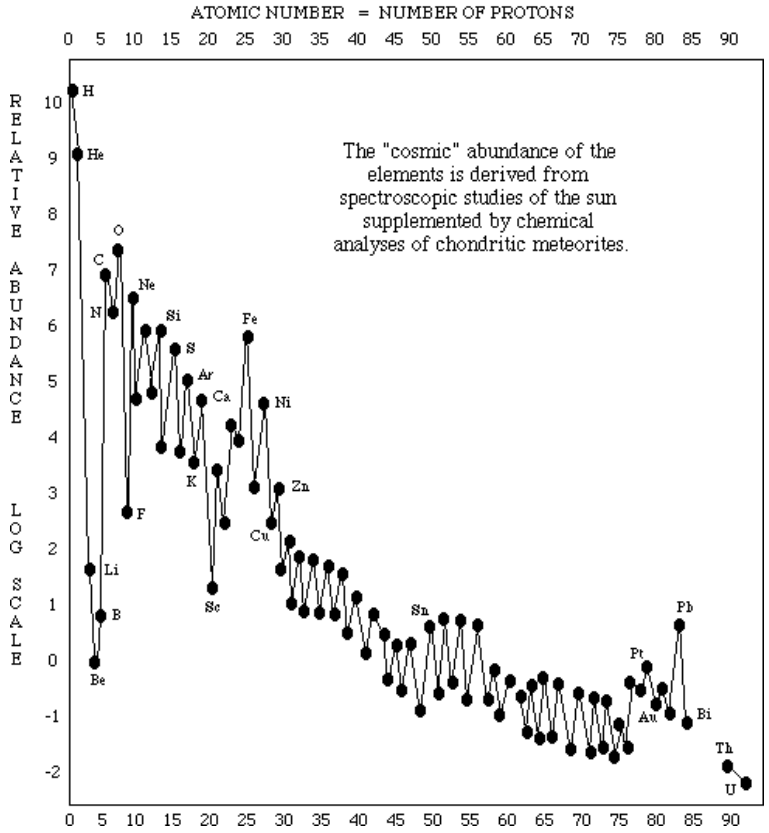
Intro. Astrophysics II NAME:
HW #5
Due Monday March 9
FOR ALL PROBLEMS, SHOW YOUR WORK



1. The diagram above shows the "cosmic" abundances of the predominant isotopes of the various elements. For most of the elements heavier than *C*, there is a definite pattern that causes every "even" atomic numbered element to be more abundant than the "odd" numbered ones. *Why is this so?* The pattern breaks down near *Fe*. This is partly because ^{56}Fe is a "magic-number" nucleus that is particularly stable. But what else is different about the way that nuclei near Fe are made than the way that the lighter elements (C, O, etc.) are made? *(4 points*)

2. An astronomer reports the discovery a pair of white dwarf stars in a binary system. The individual stars have distances of 1 AU and 5 AU from the center of mass of the system, and a mutual orbital period of 6 years. Assuming that both stars are completely relativistic-degenerate objects, what can be said about the hydrogen content of the two stars? Is your answer realistic (*Hints: solve for the masses of the two individual stars first, using the period versus orbital sizes in AU, years, and solar masses*) (*6 points*)

3. Below is the spectrum of a low-mass astronomical object. The horizontal lines indicate wavelengths where the data is of low quality due to the high opacity of the Earth's atmosphere. Based on what you know, which spectral classification best fits the observed spectral characteristics: M, L, or T? Justify your answer. *(4 points)*