ASSIGNMENT 4. Astronomy 101. Nov. 2006

Available: Wed Nov 22, 2006. Due : Friday Dec 1 * by 5PM * in _your_ lab slot, Hennings 312.
Late Penalty: -30% if in slot by 5 PM Monday Dec 4th. FINAL DEADLINE.

Format: Normal lined 8.5x11" paper with pages STAPLED together if >1 page. Name and Student ID# on 1st page

Grading: Only 1 question of 3 will be graded, determined randomly.

Q1. Text problem 52 in Chapter 13 (of the 4th edition of the textbook).

Q2. Assuming that comets have an albedo A=0.04, make a table of distance vs temperature and compute the `no greenhouse' temperature for a comet at a distance of

a. 30,000 AU (in the Oort cloud)
b. 45 AU (in the Kuiper Belt)
c. 8 AU (halfway from Jupiter to Saturn)
d. 3 AU (coming through the asteroid belt)
e. 1 AU (perihelion near Earth).

Add two more columns to your table and enter a yes or no for whether or not water ice (150K) or methane ice (40K) would be sublimating at that distance, where the temperatures given are the sublimation temperatures for that ice at the relevant pressure.

Q3. Atmospheric escape of hydrogen from Venus.

a) Calculate the escape speed from the exosphere of Venus, taking the height to be 200 km above the surface of Venus (see Box 4.4 and classroom notes).
b) Compute the thermal speed for both a hydrogen atom and its isotope deuterium (which has a mass of two protons) given that the exosphere's temperature is 350 K. Compare these to the escape speed to determine if one or both should have escaped the venusian atmosphere.
c) Would you expect the noble gas Helium-4 to still be present in the venusian exosphere if Venus had originally captured some of this abundant nebular gas into its atmosphere 4.5 billion years ago?