

**Physics 311, Fall 2008**

## **HOMEWORK SET 10**

Due Dec 9, Tuesday

Chap 16: Q6, Q13, Chap 12, Q51

A1: Explain how the nebular hypothesis can account for the following properties of the solar system: (a) the terrestrial planets orbiting close to the Sun are relatively small and composed primarily of rocky substances, while the Jovian planets orbiting far from the Sun are relatively large and composed primarily of hydrogen and helium; (b) all of the planets orbit the Sun in the same direction, and all of their orbits are in nearly the same plane.

A2: (a) if 1kg of coal is burnt in 1 second, it will produce 2 million watts of power. How many kilograms would have to be burnt each second to produce the Sun's energy output (i.e., luminosity)? If the Sun were made of coal, how much time would pass before it would burn out at its present rate of energy output?

(b) if the Sun were originally 100% of hydrogen, and only 10% of its mass can be converted from hydrogen into helium. How many years could the Sun maintain its energy output at its present rate?