普通天文學　二００六年秋 期中考

2006.11.06 下午 3：00～4：50

一、問答題：從 1～8 題中選出 6 題（只選 6 題，多答不計分）作答，每題 10 分

1. How does the Earth's atmosphere affect ground-based astronomical observations? What are the advantages and disadvantages of a space observatory?

2. Draw a diagram to show the relative position of the Sun, Earth, and moon during a lunar eclipse. Can one see a lunar eclipse during the day? What would have been the lunar phase in the night of a lunar eclipse? Why isn't there a lunar eclipse happening every month?

3. Prove that if a particle moves in a central force field (1) its path must be a plane curve, and (2) the angular momentum must be conserved.

4. From Newton's law of gravitation, prove the Kepler's 3rd law of planetary motion, i.e., the squares of the orbital periods of planets are directly proportional to the cubes of the semi-major axis of the orbits, $T^2=[4\pi^2/G(M+m)]\,a^3$, where M is the mass of the Sun, T is the orbital period of the planet, a is the semi-major axis of the planet's orbit, m is the mass of the planet, and G is the universal gravitational constant.

5. The Hubble Space Telescope (HST) has a primary mirror of 2.4 m diameter. What is the optical diffraction limit of the HST if observing in the optical wavelengths? Each Keck Telescope has a mirror equivalent to 10 m in diameter. Compare the light-gathering power and the angular resolving power of the HST and the Keck Telescope.

6. Our body has a normal temperature of 37 degrees Celcius. Assuming our body radiates approximately like a blackbody, estimate the wavelength at which our body emits the most radiation.

7. Write down the names of the planets in our solar systems which are classified as "***terrestrial planets***", and those as "***jovian planets***". Compare between the "terrestrial planets" and the "jovian planets" in terms of mass, size, density, chemical composition, and number of moons. What is the main reason that causes the difference of these two kinds of planets?

8. Describe one method to discover a planet orbiting a distant star, i.e., other than our Sun. State whatever limitations of the method.

二、從下列名詞中選擇 10 個翻譯並簡單解釋（每小題 4 分） (1) Right Ascension; (2) zenith; (3) precession; (4) greatest elongation; (5) retrograde motion (of Mars); (6) Occam's razor; (7) adaptive optics; (8) parallax; (9) Doppler effect; (10) proper motion; (11) exoplanet; (12) planetesimal